

FIG. 1

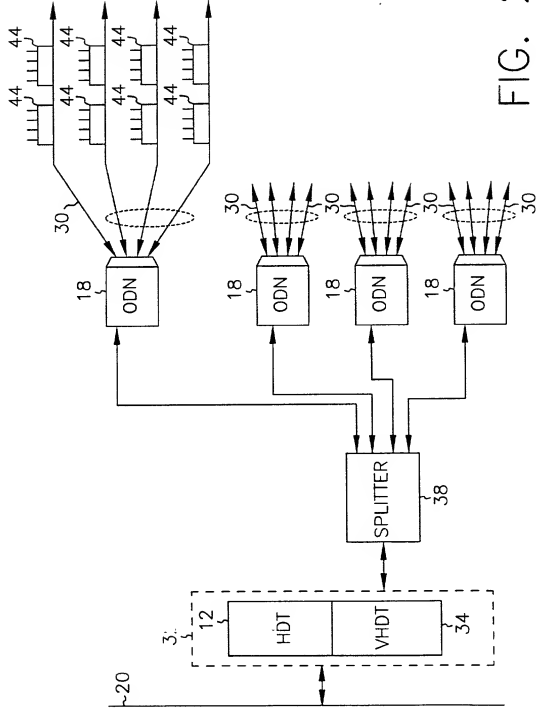
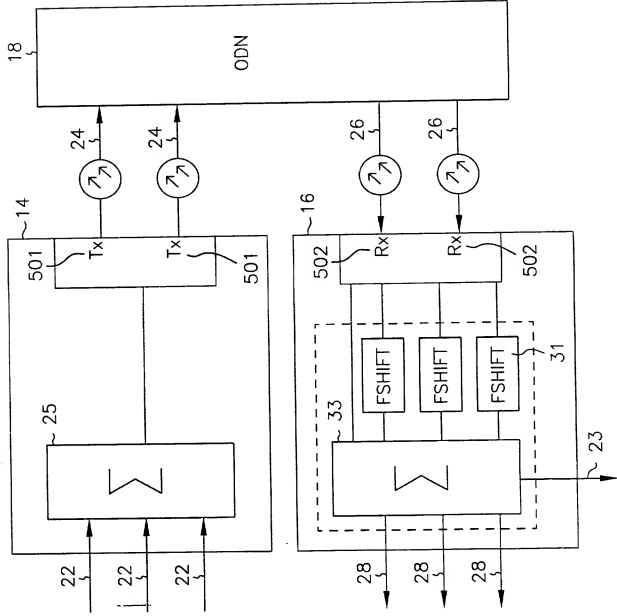




FIG. 4



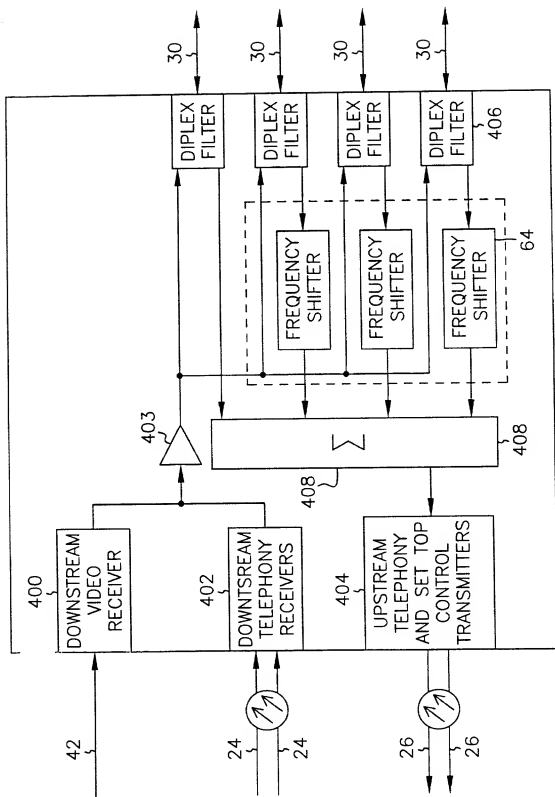


FIG. 5

FIG. 6

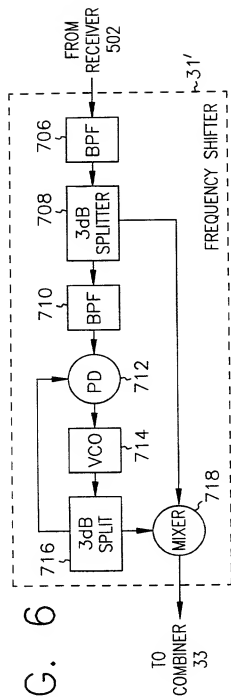
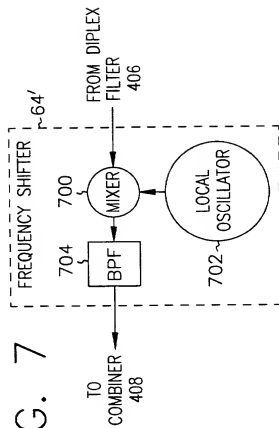


FIG. 7



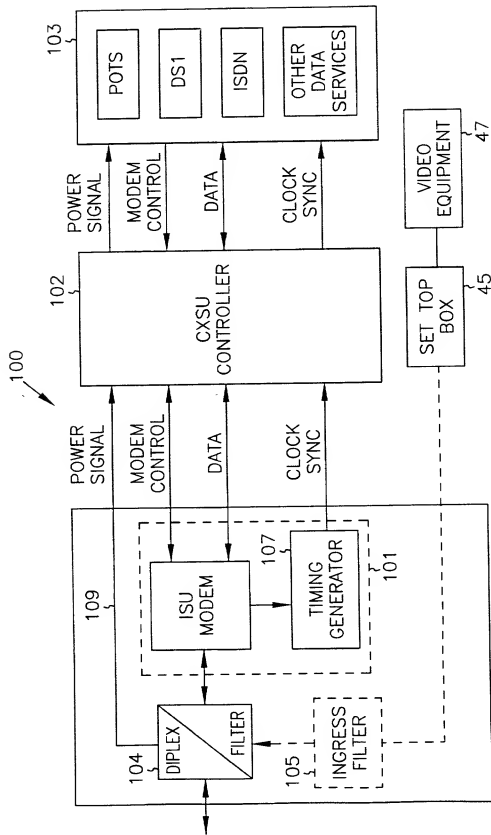


FIG. 8

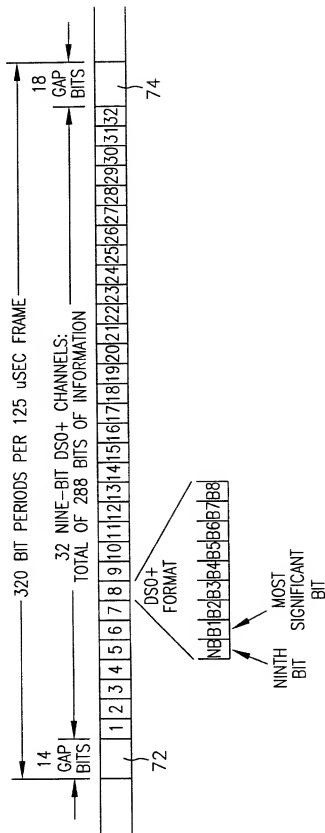


FIG. 9

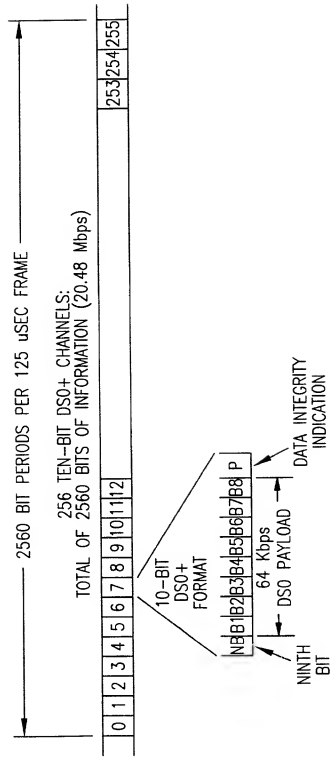


FIG. 10

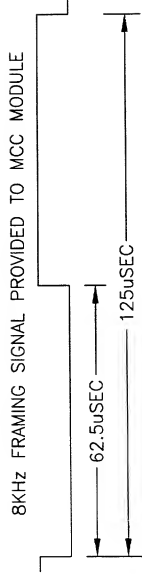


FIG. 11

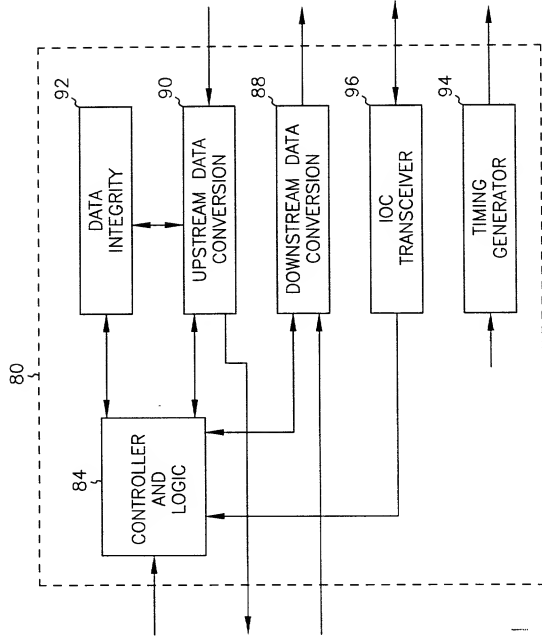


FIG. 12

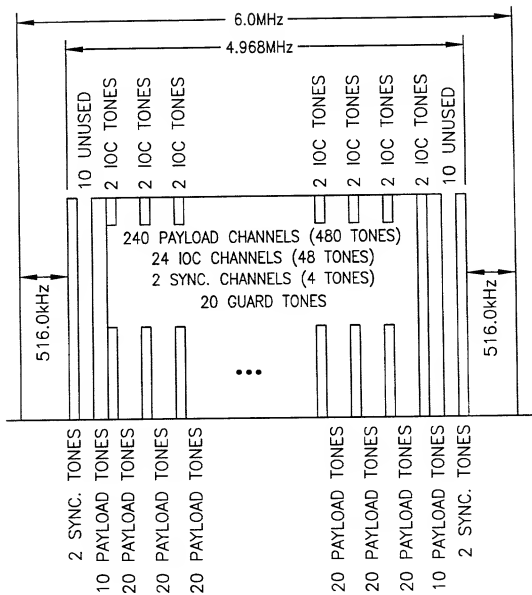


FIG. 13

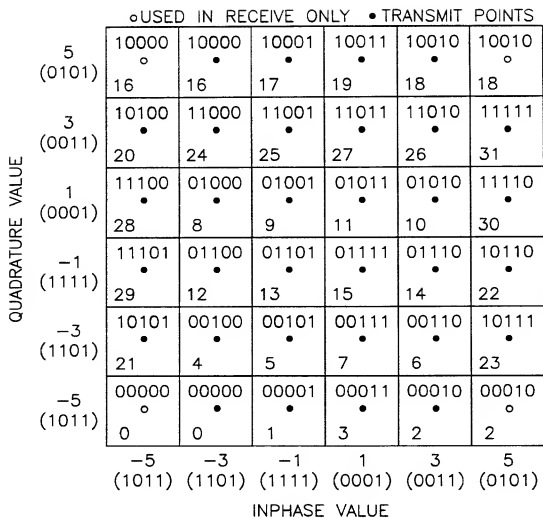


FIG. 14

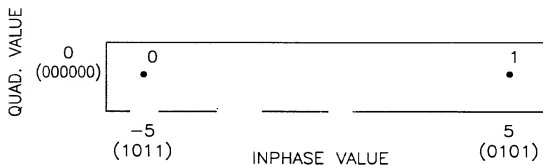


FIG. 15

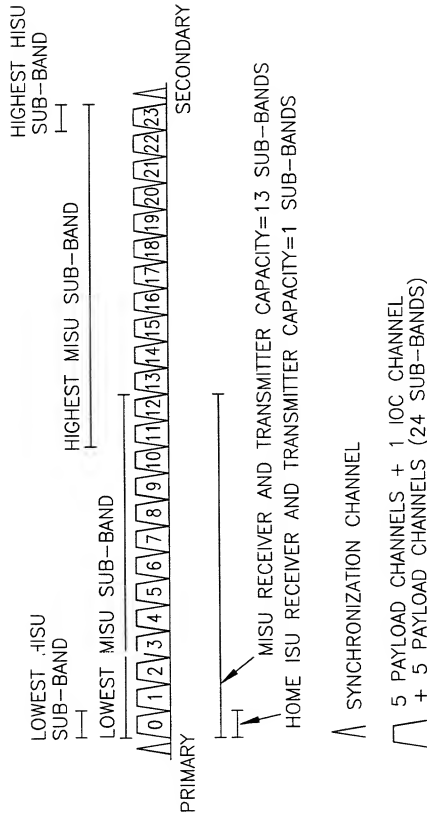


FIG. 16

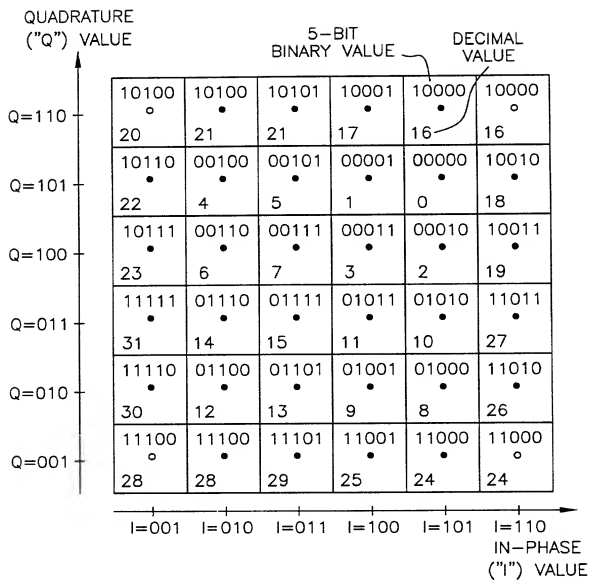


FIG. 17

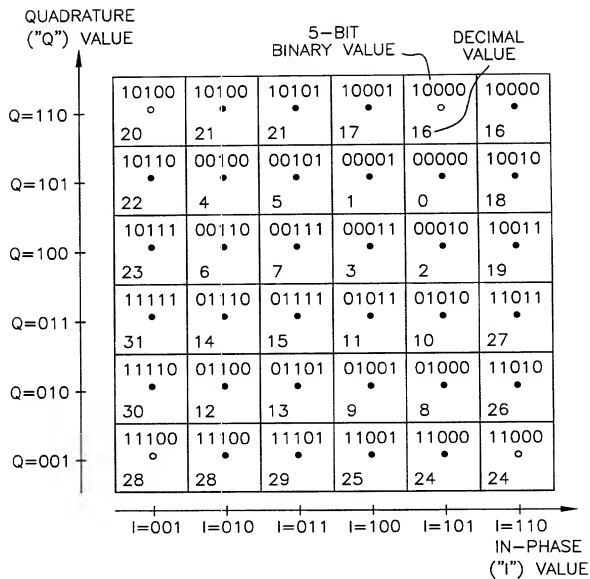


FIG. 18

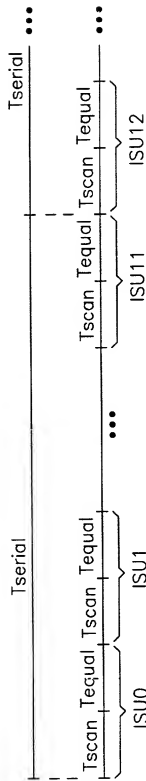


FIG. 19

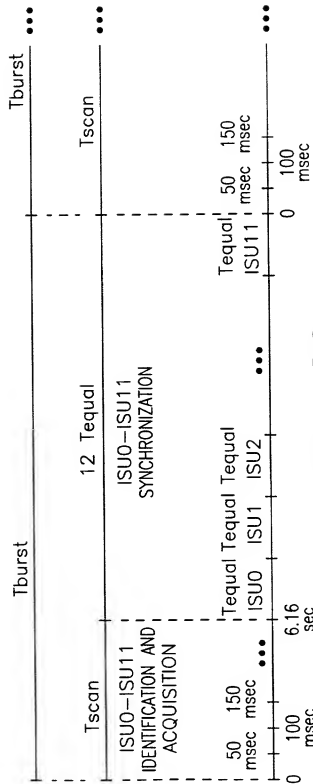


FIG. 20

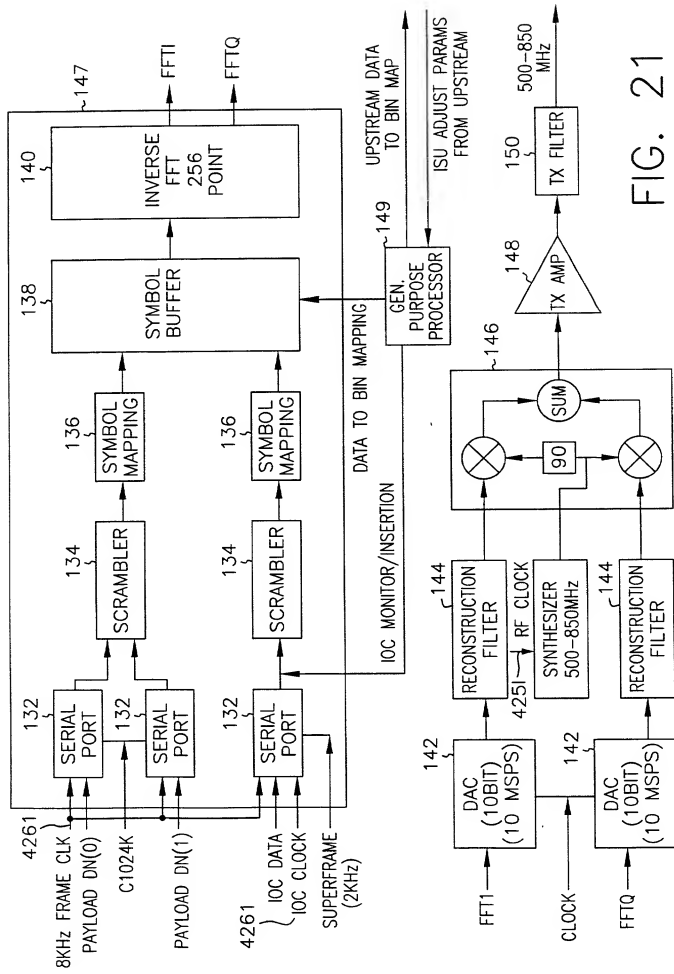


FIG. 21

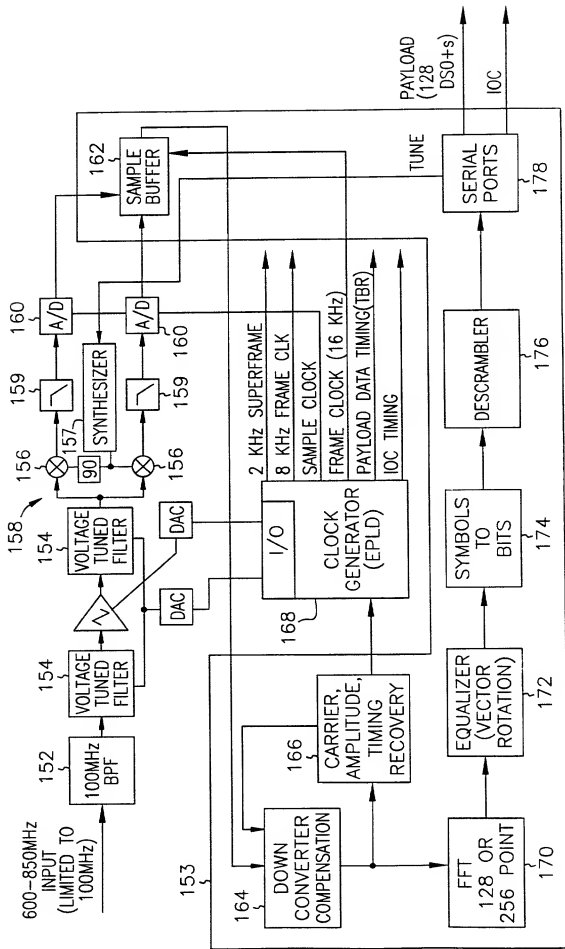
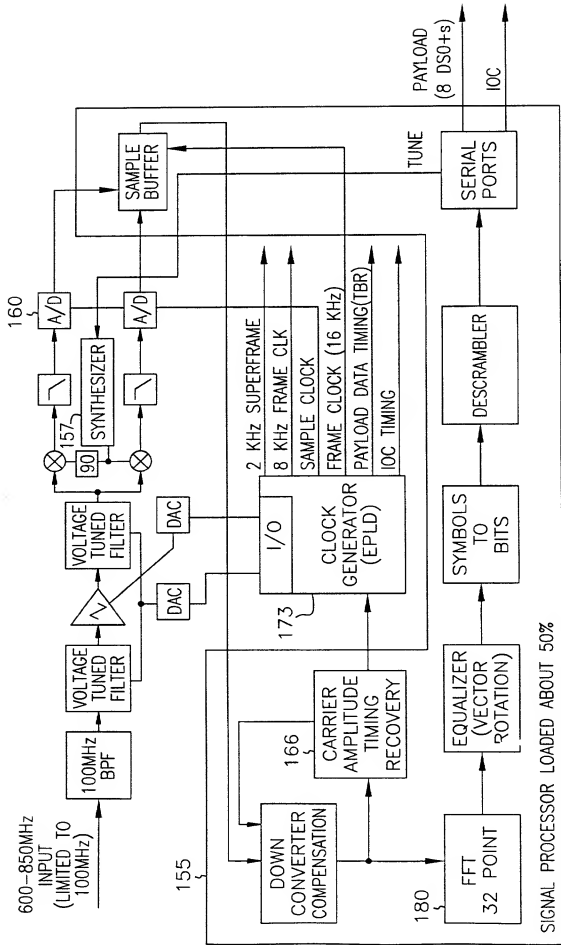


FIG. 22



SIGNAL PROCESSOR LOADED ABOUT 50%

FIG. 23

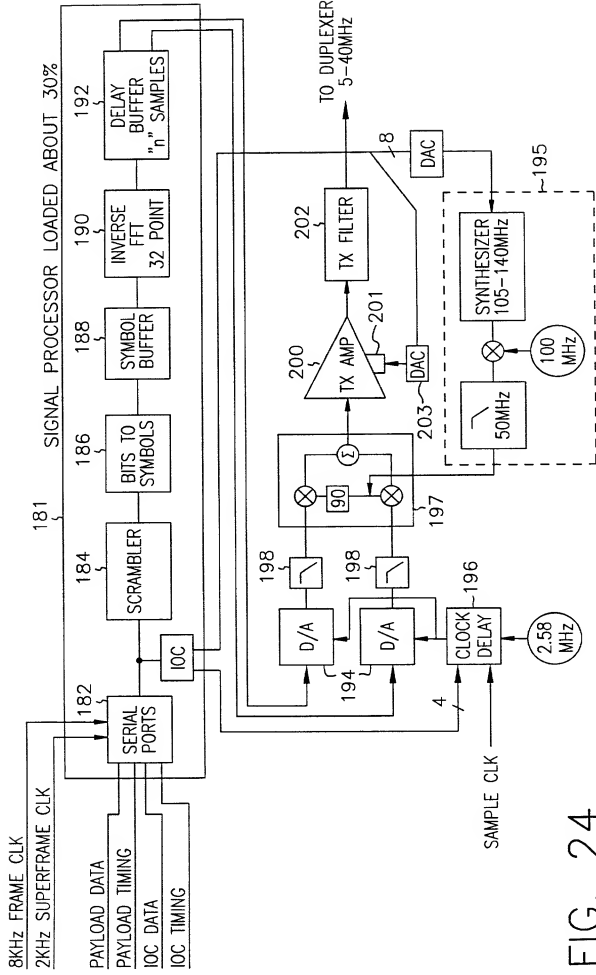


FIG. 24

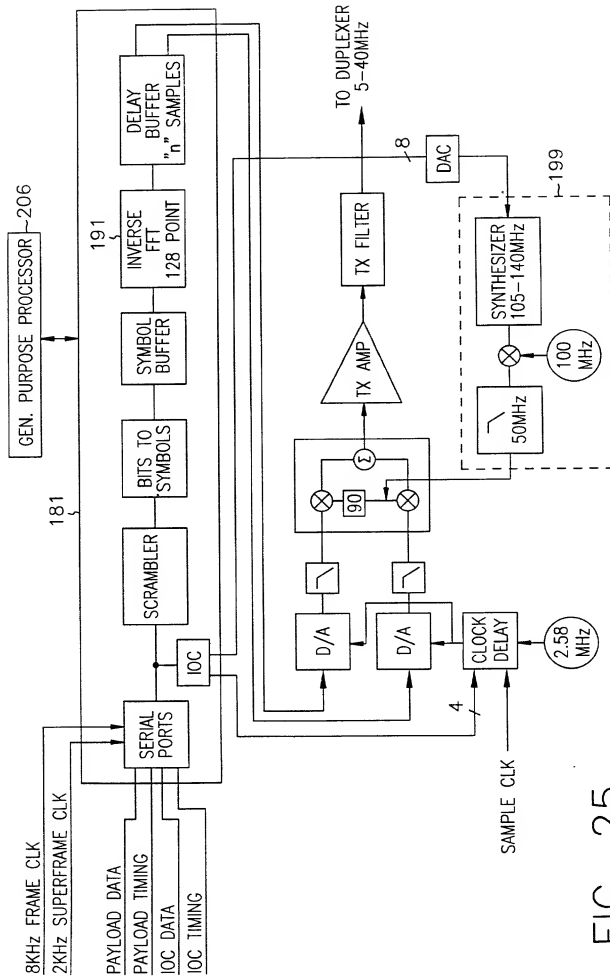
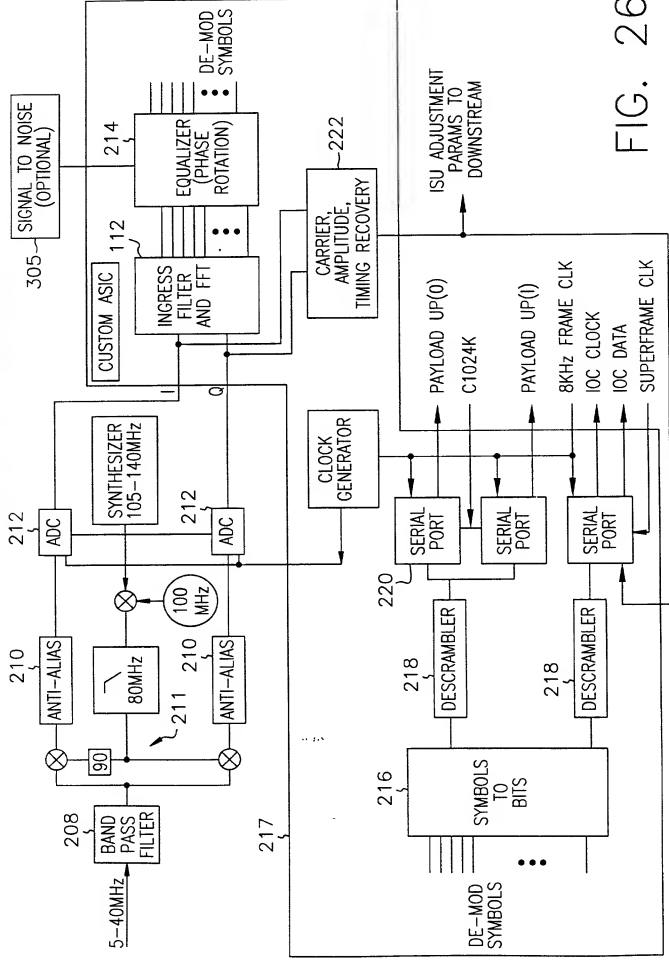


FIG. 25



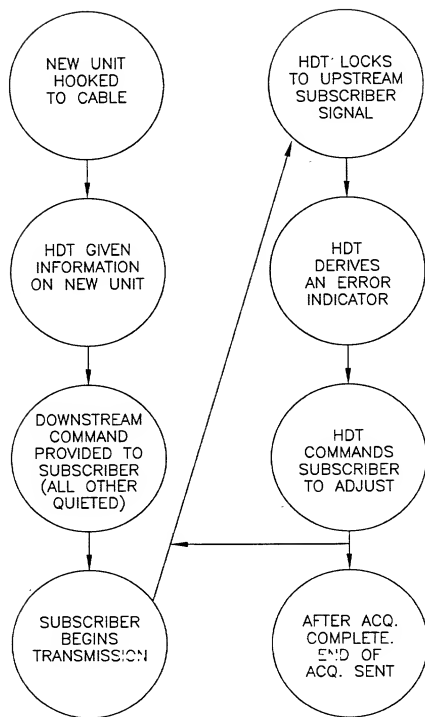


FIG. 27

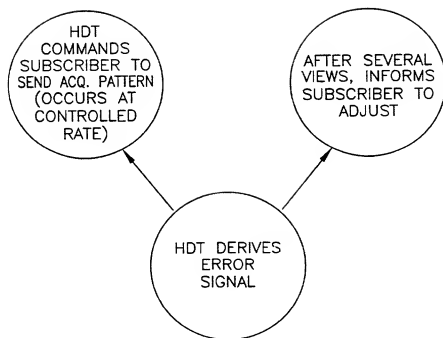


FIG. 28

Magnitude response of a single polyphase filter bank

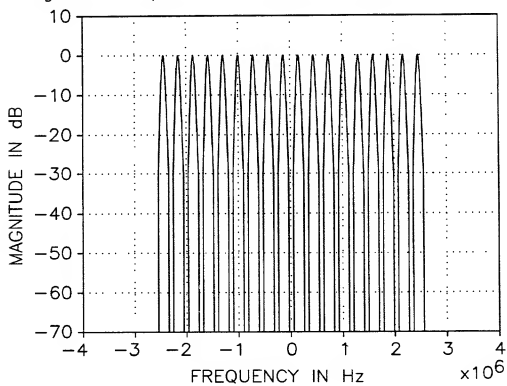


FIG. 29

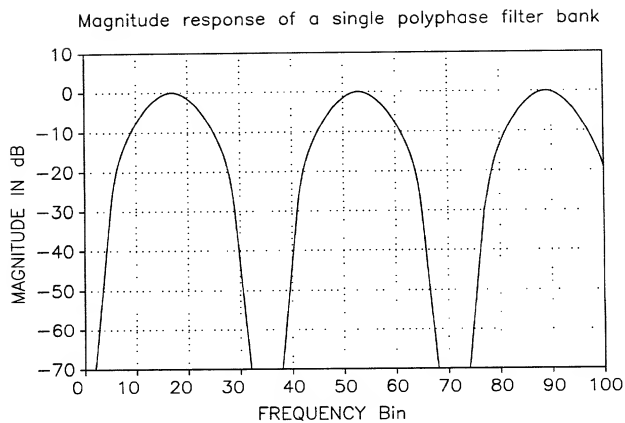


FIG. 30

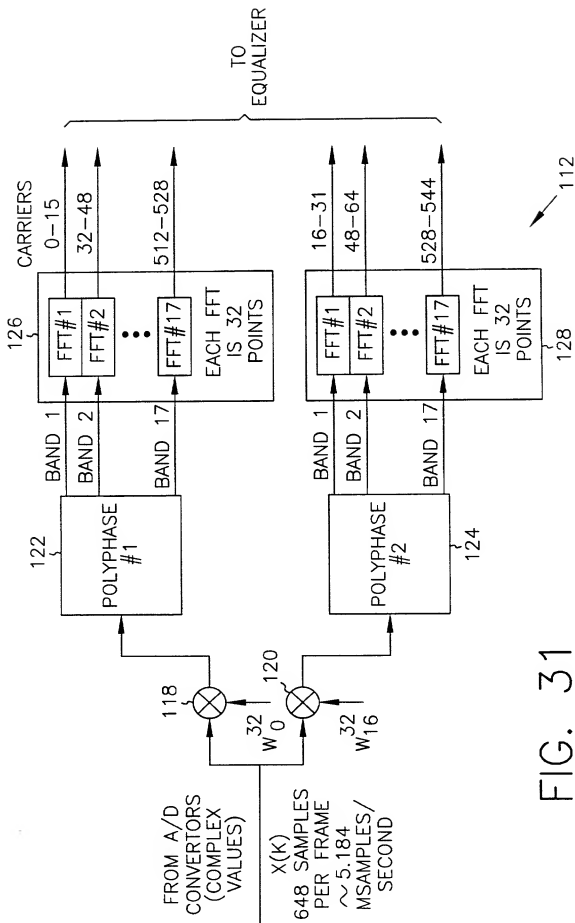


FIG. 31

SAMPLE RATE=  
5,184 MSAMPLES  
PER SECOND  
648 SAMPLES  
PER FRAME  
 $x(k)$

TRANSFORM RATE=  
288 KHz

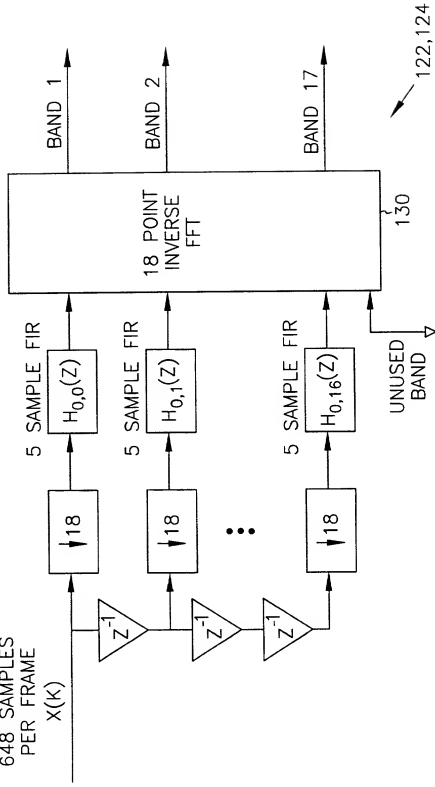


FIG. 32

FIG. 33

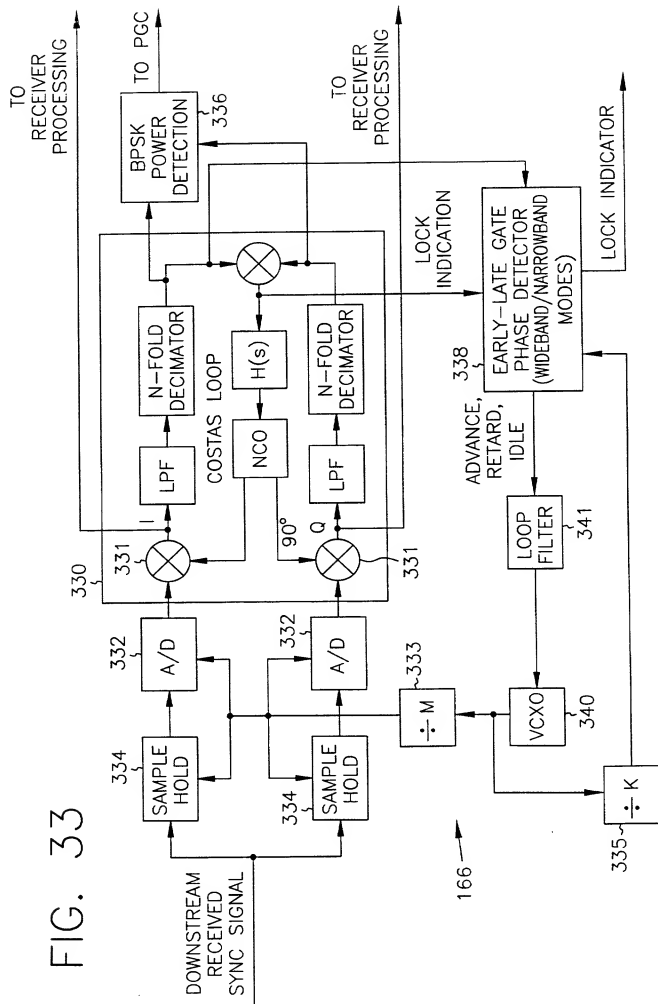
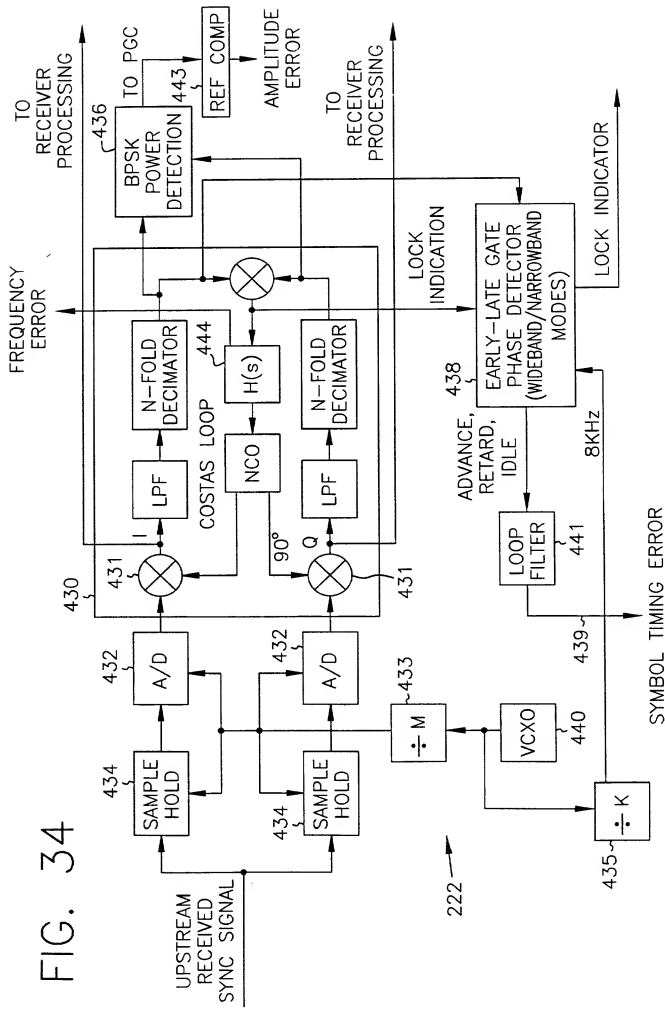


FIG. 34



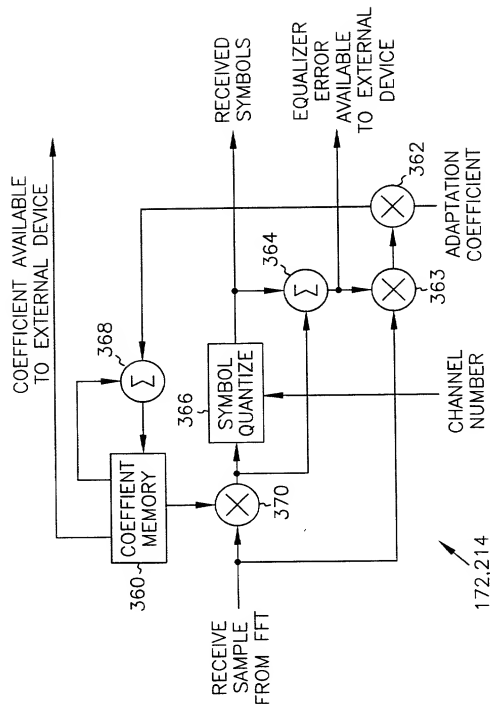


FIG. 35

172,214

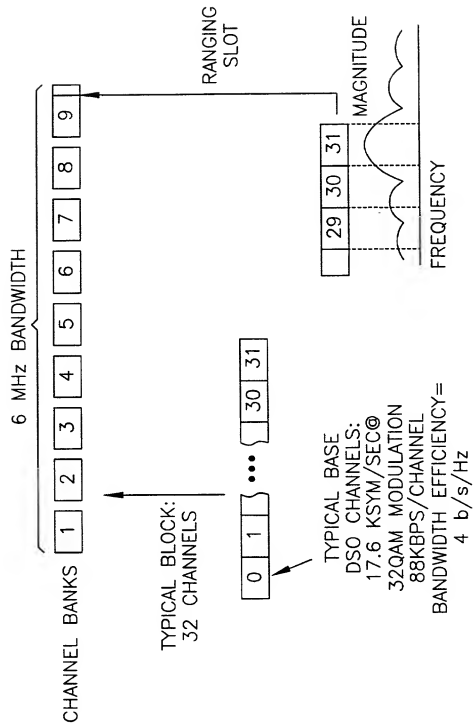


FIG. 36

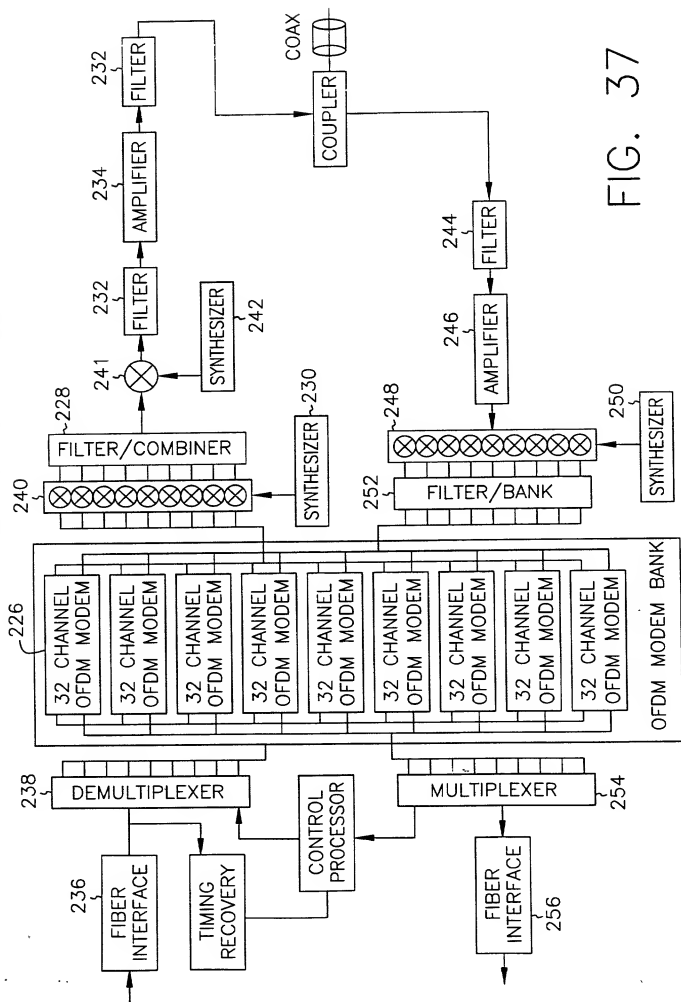


FIG. 37

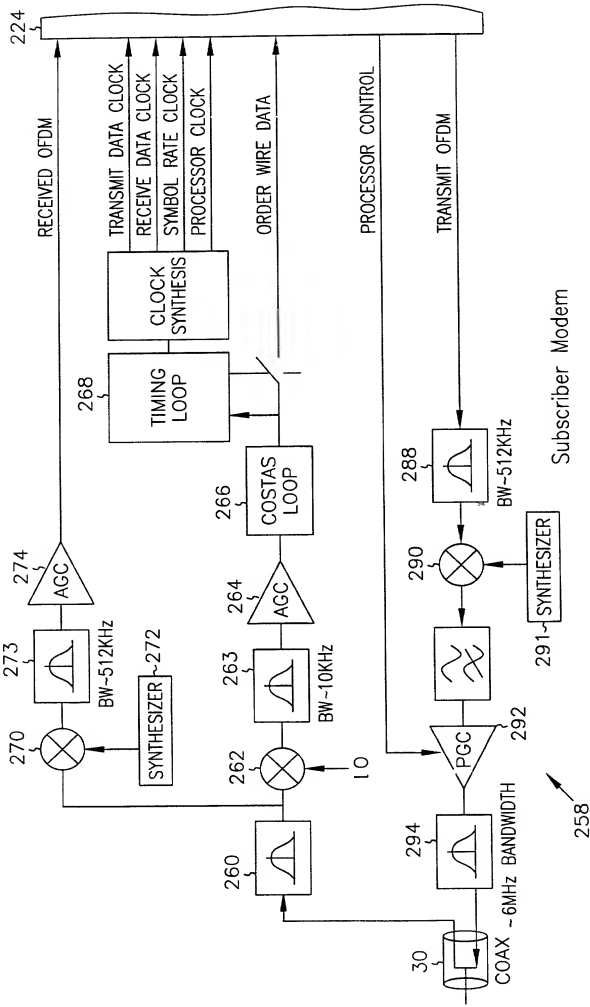


FIG. 38

Subscriber Modem

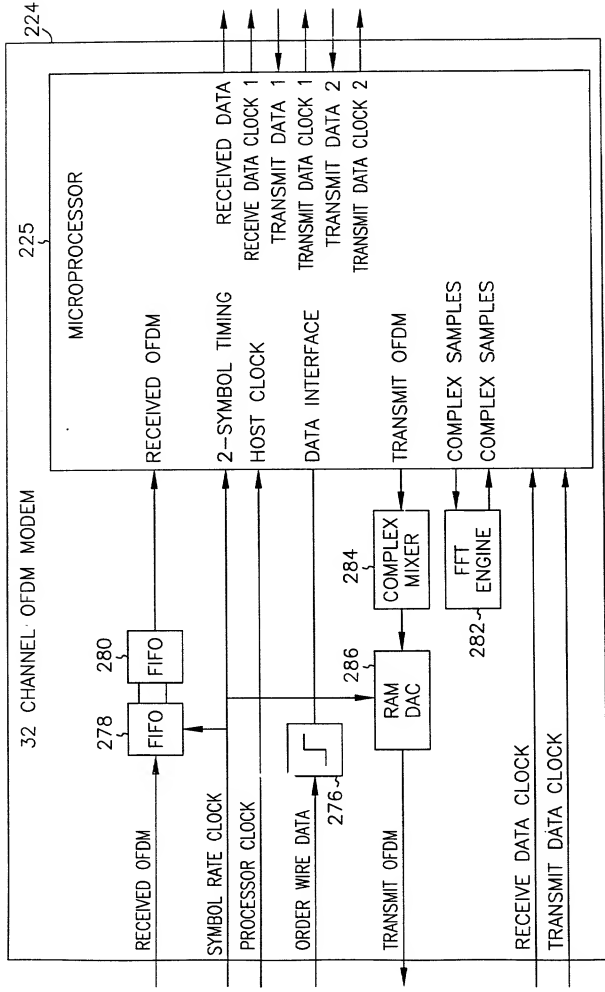


FIG. 39

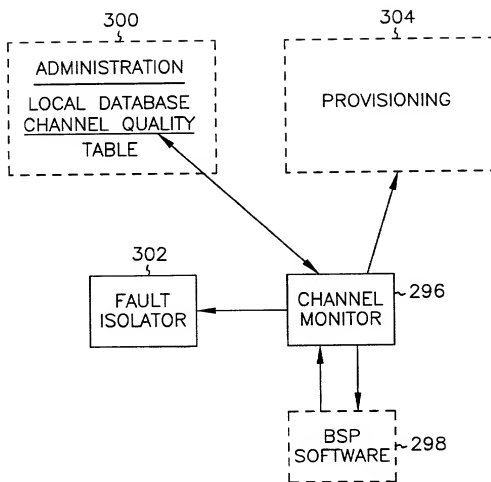


FIG. 40

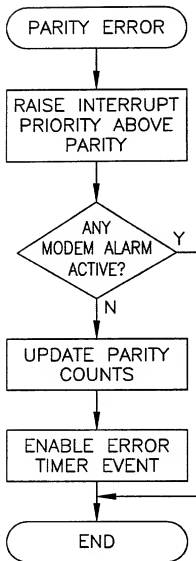


FIG. 41

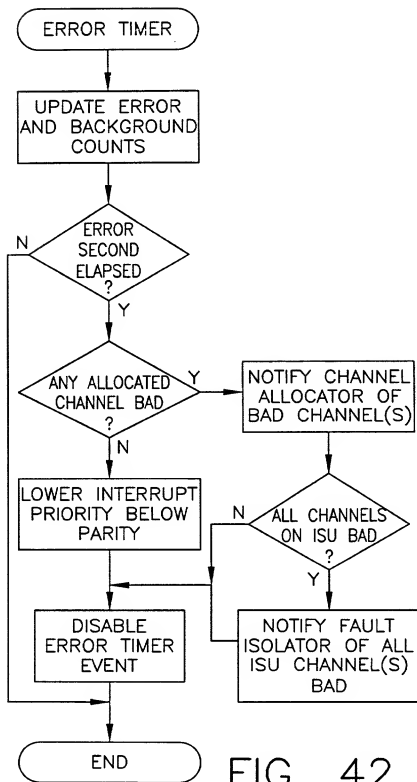


FIG. 42

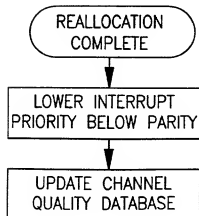
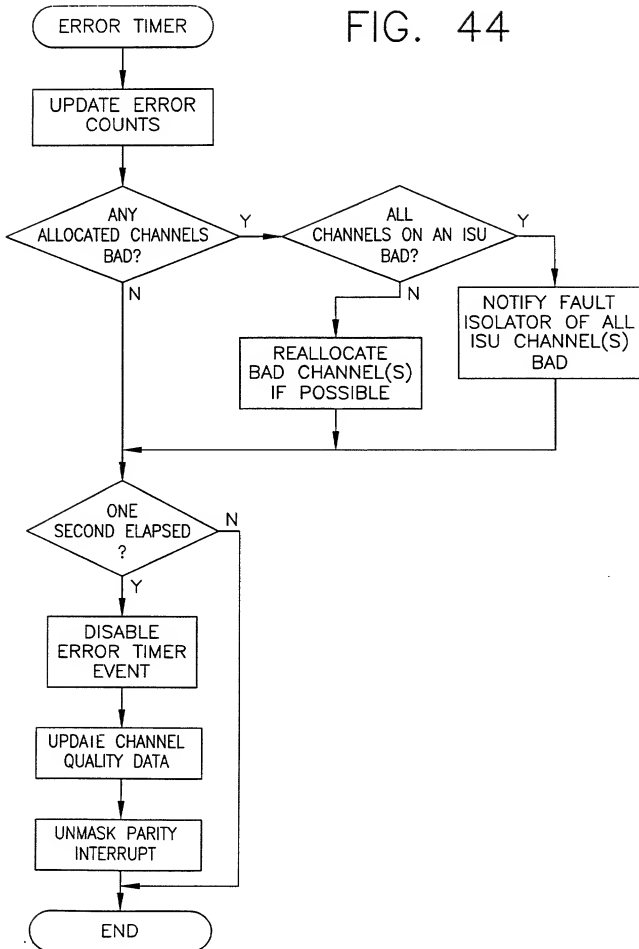


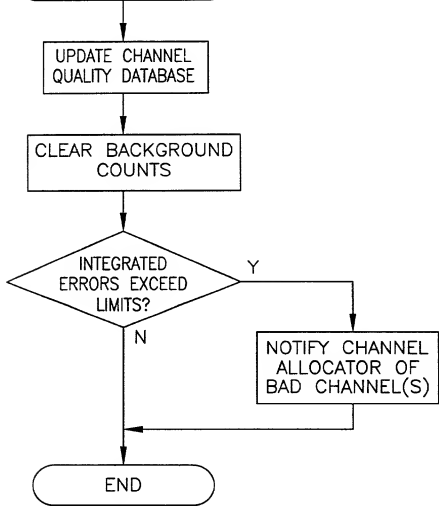
FIG. 43

FIG. 44



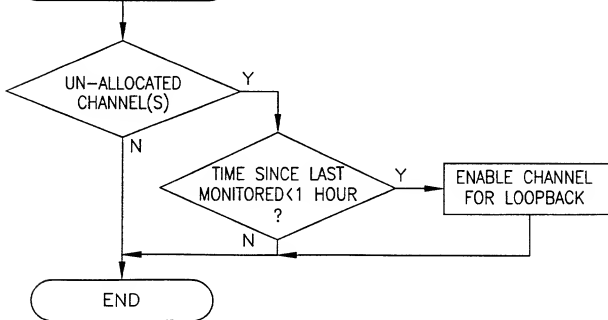
BACKGROUND TIMER

FIG. 45



BACKGROUND TIMER

FIG. 46



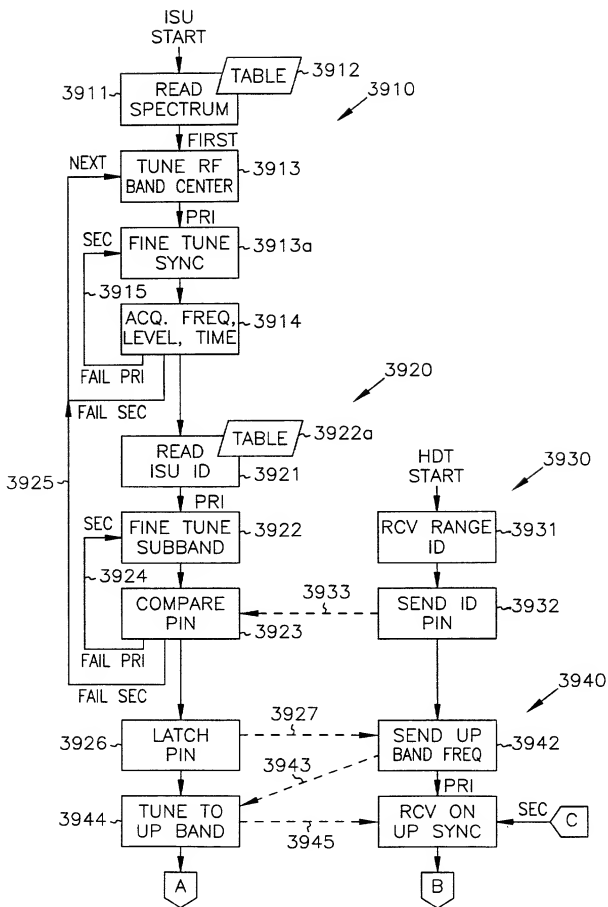


FIG. 47

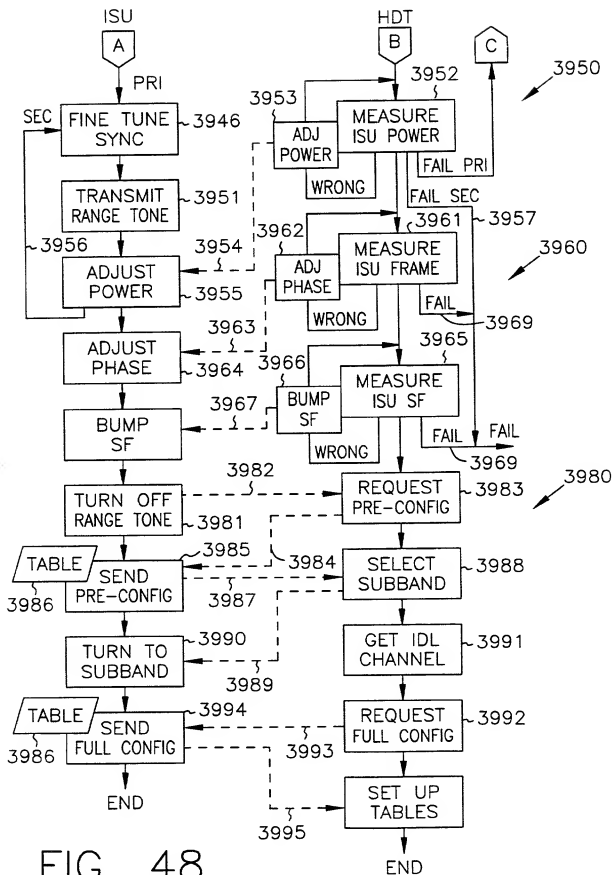


FIG. 48

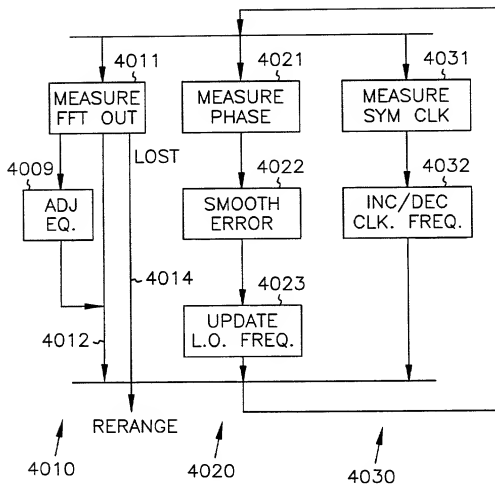


FIG. 49

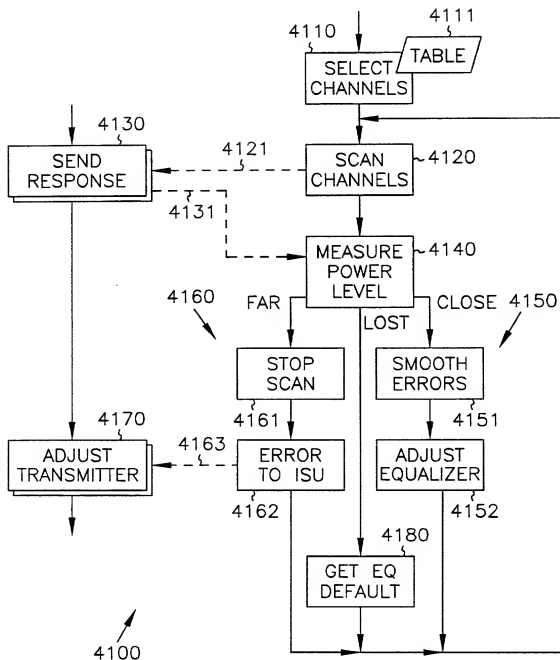


FIG. 50

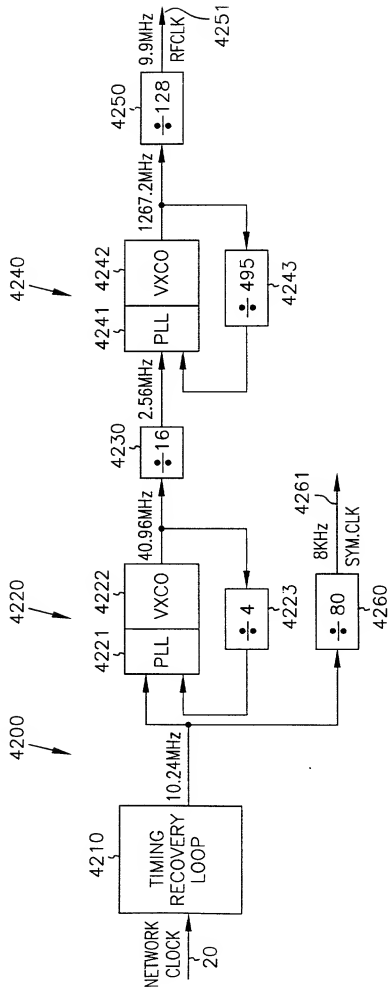


FIG. 51

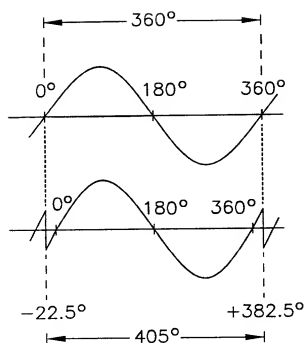


FIG. 52

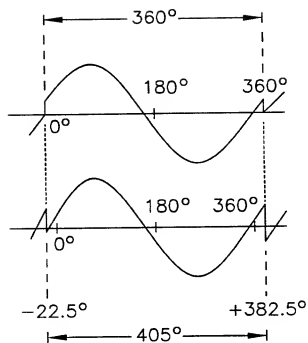


FIG. 53

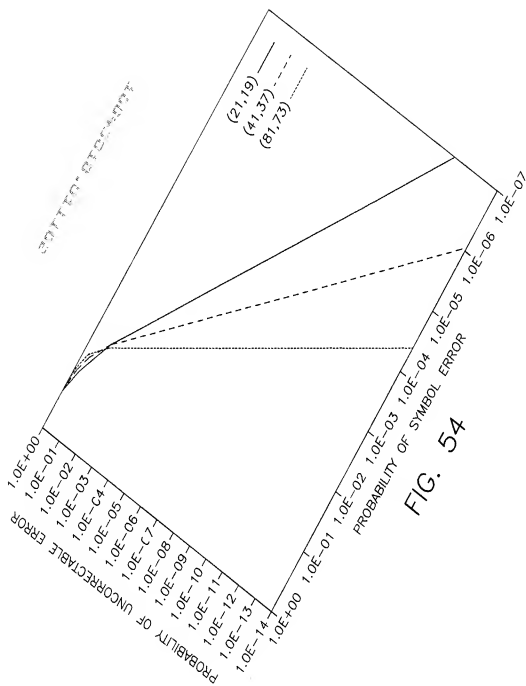


FIG. 54

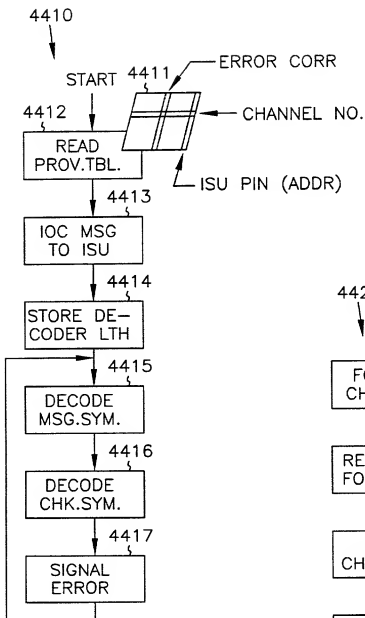


FIG. 55

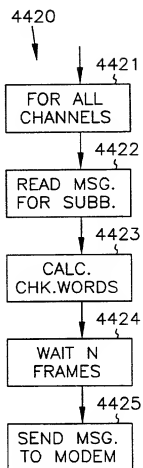


FIG. 56

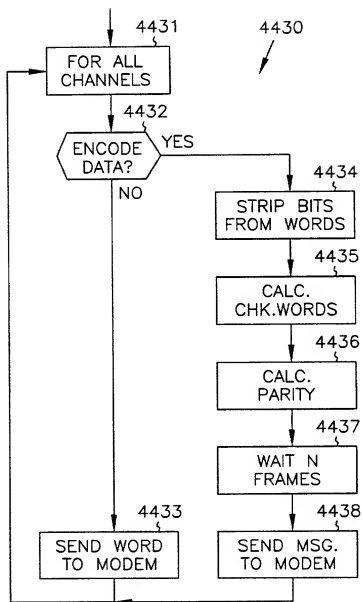


FIG. 57

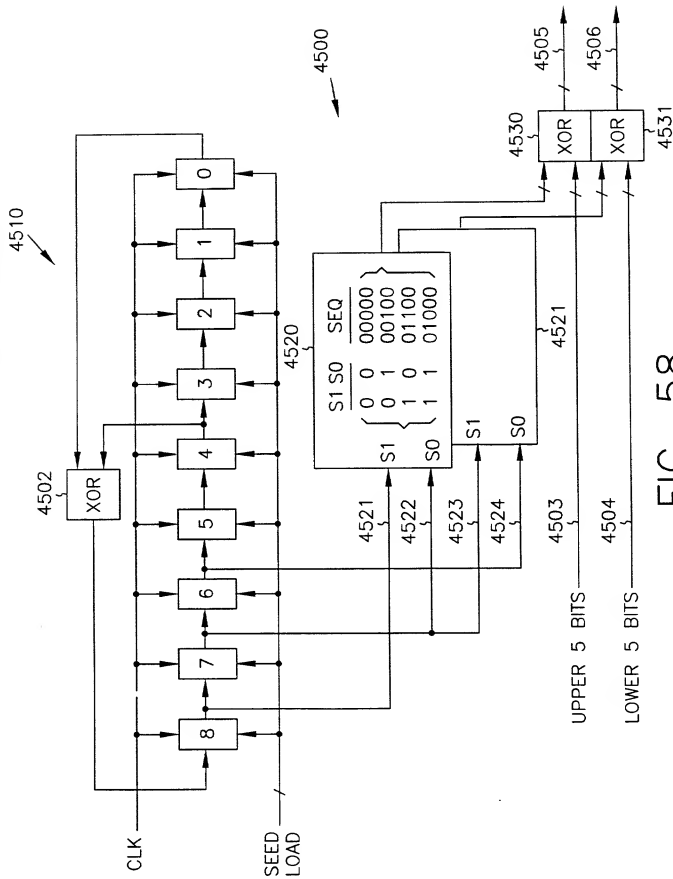


FIG. 58

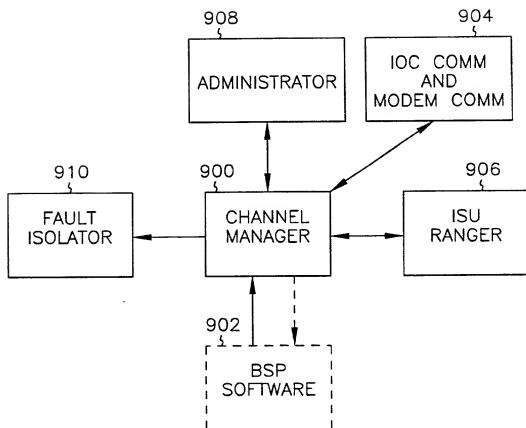


FIG. 59

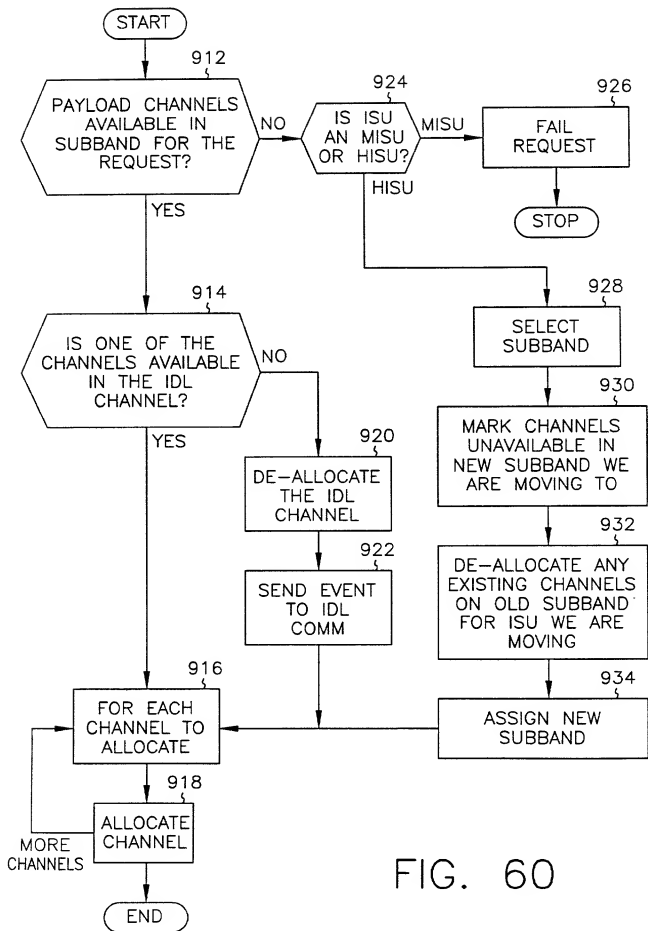


FIG. 60

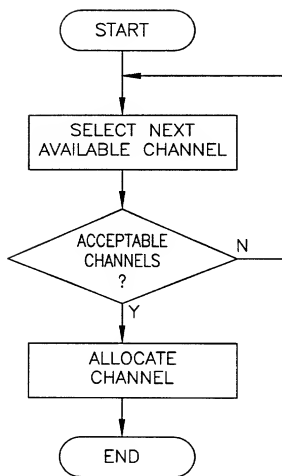


FIG. 61

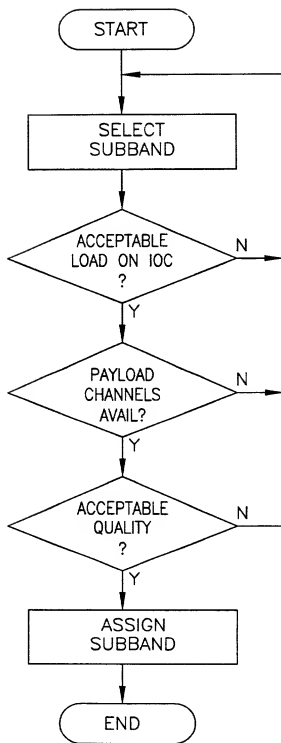


FIG. 62

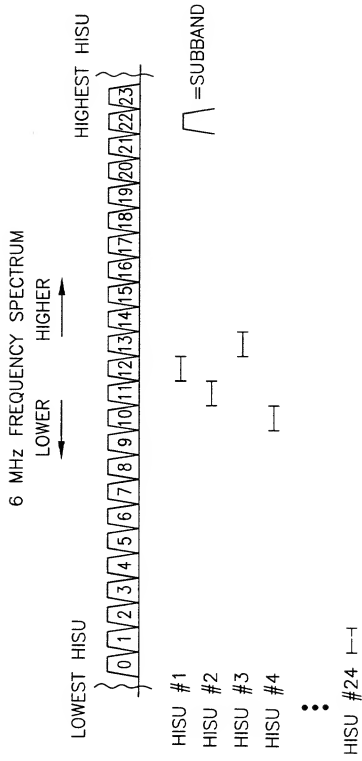


FIG. 63

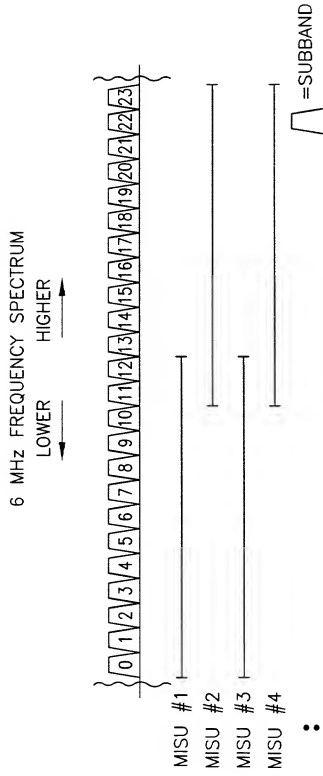


FIG. 64

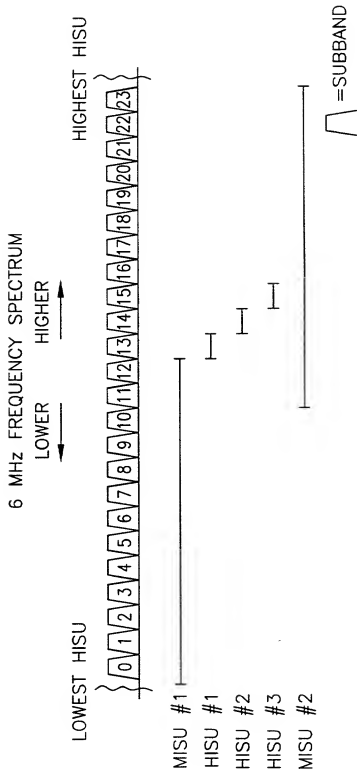


FIG. 65

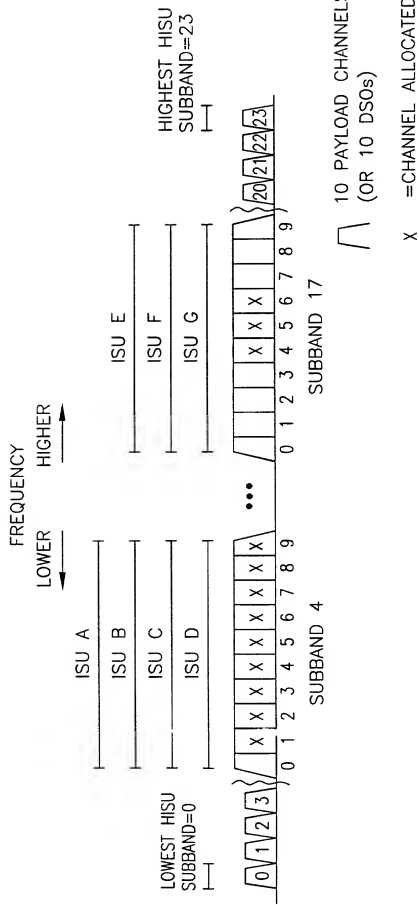


FIG. 66

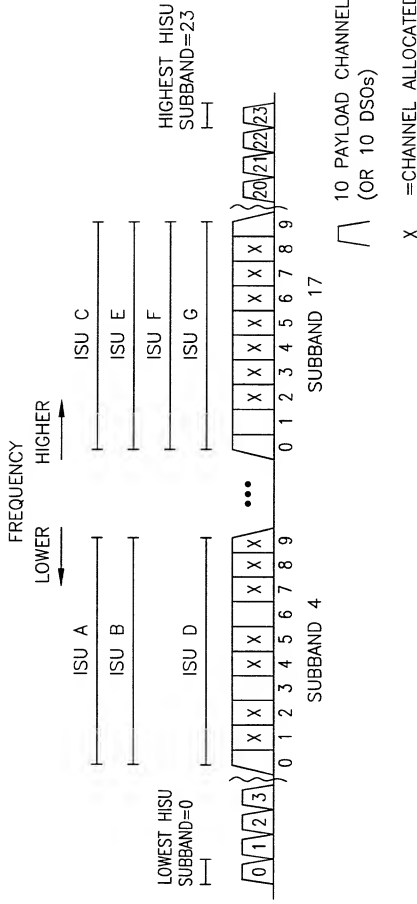


FIG. 67

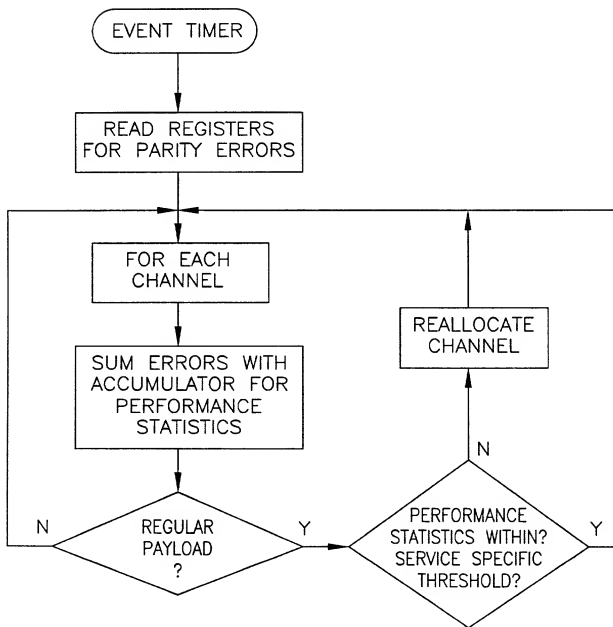


FIG. 68

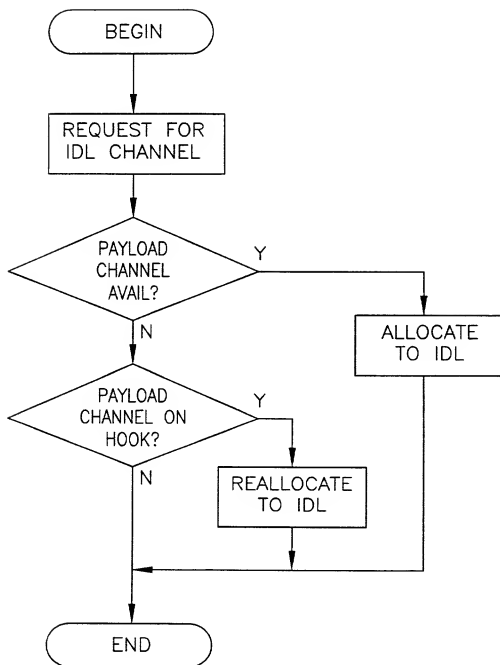


FIG. 69

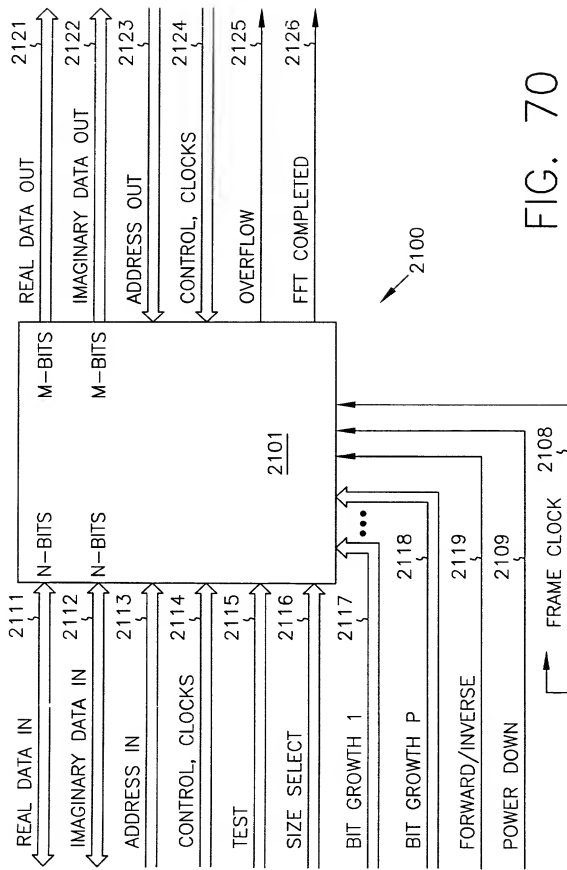


FIG. 70

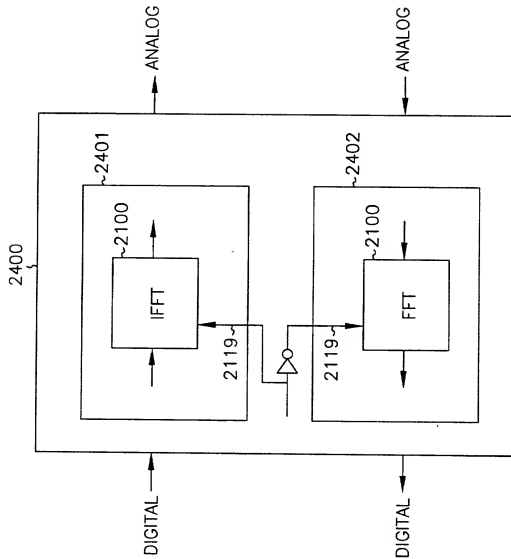


FIG. 71

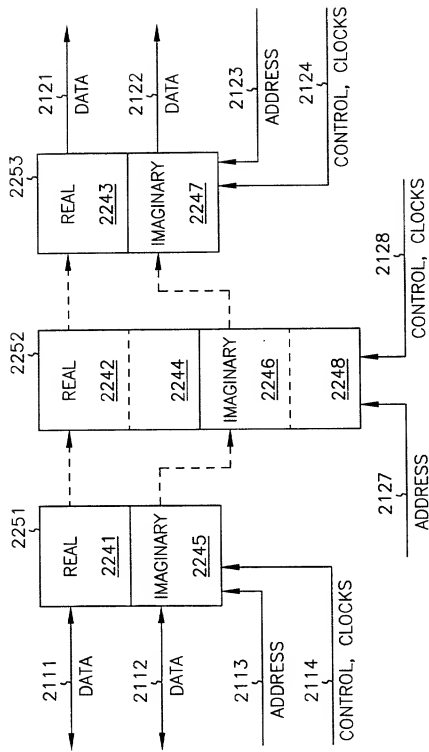


FIG. 72

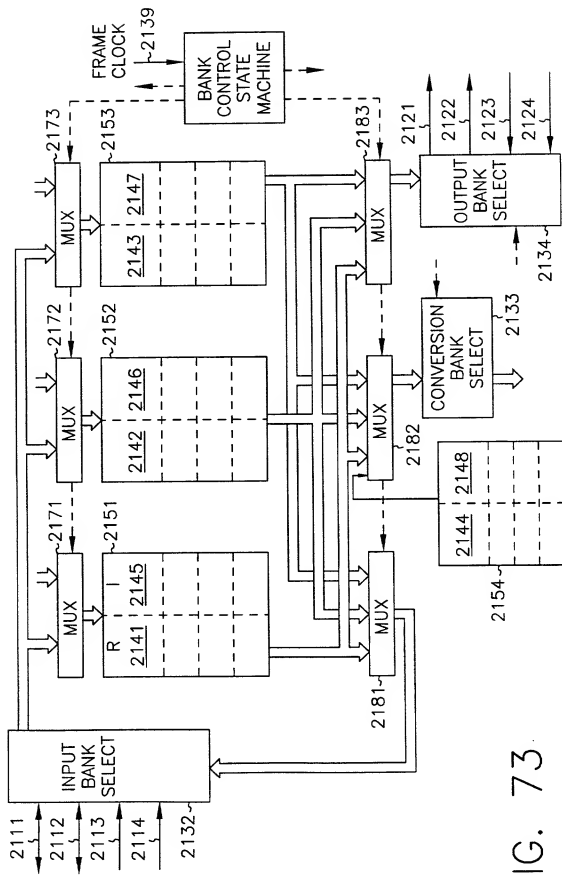
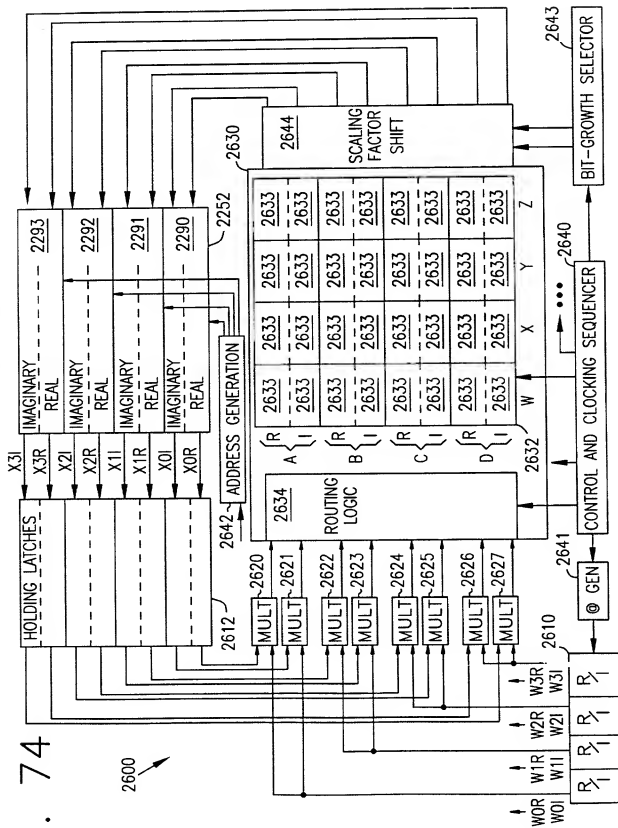


FIG. 73

FIG. 74



THIS TABLE SHOWS THE ORDER OF CALCULATION FOR A TRANSPOSED BUTTERFLY:

CO

AWR=WR AWI=WI	AXR=XR AXI=XI	AYR=YR AYI=YI	AZR=ZR AZI=ZI
BWR=WR BWI=WI	BXR=XR BXI=XI	BYR=YR BYI=YI	BZR=ZR BZI=ZI
CWR=WR CWI=WI	CXR=XR CXI=XI	CYR=YR CYI=YI	CZR=ZR CZI=ZI
DWR=WR DWI=WI	DXR=XR DXI=XI	DYR=YR DYI=YI	DZR=ZR DZI=ZI

FIG. 75

2800

~2632

CI

AWR=AWR - WI AWI=AWI + WI	AXR=AXR - XI AXI=AXI + XI	AYR=AYR - YI AYI=AYI + YI	AZR=AZR - ZI AZI=AZI + ZI
BWR=BWR - WI BWI=BWI + WI	BXR=BXR - XI BXI=BXI + XI	BYR=BYR - YI BYI=BYI + YI	BZR=BZR - ZI BZI=BZI + ZI
CWR=CWR - WI CWI=CWI + WI	CXR=CXR - XI CXI=CXI + XI	CYR=CYR - YI CYI=CYI + YI	CZR=CZR - ZI CZI=CZI + ZI
DWR=DWR - WI DWI=DWI + WI	DXR=DXR - XI DXI=DXI + XI	DYR=DYR - YI DYI=DYI + YI	DZR=DZR - ZI DZI=DZI + ZI

FIG. 76

2800

~2632

C2

AWR=AWR +WR AWI=AWI +WI	AXR=AXR +XI AXI=AXI -XR	AYR=AYR -YR AYI=AYI -YI	AZR=AZR -ZI AZI=AZI +ZR
BWR=BWR +WR BWI=BWI +WI	BXR=BXR +XI BXI=BXI -XR	BYR=BYR -YR BYI=BYI -YI	BZR=BZR -ZI BZI=BZI +ZR
CWR=CWR +WR CWI=CWI +WI	CXR=CXR +XI CXI=CXI -XR	CYR=CYR -YR CYI=CYI -YI	CZR=CZR -ZI CZI=CZI +ZR
DWR=DWR +WR DWI=DWI +WI	DXR=DXR +XI DXI=DXI -XR	DYR=DYR -YR DYI=DYI -YI	DZR=DZR -ZI DZI=DZI +ZR

2800

FIG. 77

C3

AWR=AWR -WI AWI=AWI +WR	AXR=AXR +XR AXI=AXI +XI	AYR=AYR +YI AYI=AYI -YR	AZR=AZR -ZR AZI=AZI -ZI
BWR=BWR -WI BWI=BWI +WR	BXR=BXR +XR BXI=BXI +XI	BYR=BYR +YI BYI=BYI -YR	BZR=BZR -ZR BZI=BZI -ZI
CWR=CWR -WI CWI=CWI +WR	CXR=CXR +XR CXI=CXI +XI	CYR=CYR +YI CYI=CYI -YR	CZR=CZR -ZR CZI=CZI -ZI
DWR=DWR -WI DWI=DWI +WR	DXR=DXR +XR DXI=DXI +XI	DYR=DYR +YI DYI=DYI -YR	DZR=DZR -ZR DZI=DZI -ZI

2800

FIG. 78

C4

~2632

AWR=AWR + WR AWI=AWI + WI	AXR=AXR - XR AXI=AXI - XI	AYR=AYR + YR AYI=AYI + YI	AZR=AZR -ZR AZI=AZI -ZI
BWR=BWR + WR BWI=BWI + WI	BXR=BXR - XR BXI=BXI - XI	BYR=BYR + YR BYI=BYI + YI	BZR=BZR -ZR BZI=BZI -ZI
CWR=CWR + WR CWI=CWI + WI	CXR=CXR - XR CXI=CXI - XI	CYR=CYR + YR CYI=CYI + YI	CZR=CZR -ZR CZI=CZI -ZI
DWR=DWR + WR DWI=DWI + WI	DXR=DXR - XR DXI=DXI - XI	DYR=DYR + YR DYI=DYI + YI	DZR=DZR -ZR DZI=DZI -ZI

2800

FIG. 79

C5

~2632

AWR=AWR - WI AWI=AWI + WI	AXR=AXR + XI AXI=AXI - XI	AYR=AYR - YI AYI=AYI + YR	AZR=AZR + ZI AZI=AZI - ZR
BWR=BWR - WI BWI=BWI + WI	BXR=BXR + XI BXI=BXI - XI	BYR=BYR - YI BYI=BYI + YR	BZR=BZR + ZI BZI=BZI - ZR
CWR=CWR - WI CWI=CWI + WI	CXR=CXR + XI CXI=CXI - XI	CYR=CYR - YI CYI=CYI + YR	CZR=CZR + ZI CZI=CZI - ZR
DWR=DWR - WI DWI=DWI + WI	DXR=DXR + XI DXI=DXI - XI	DYR=DYR - YI DYI=DYI + YR	DZR=DZR + ZI DZI=DZI - ZR

2800

FIG. 80

C6

C6	AWR=AWR +WR AWI=AWI +WI	AXR=AXR -XI AXI=AXI +XR	AYR=AYR -YR AYI=AYI -YI	AZR=AZR +ZI AZI=AZI -ZR	~2632 2800
	BWR=BWR +WR BWI=BWI +WI	BXR=BXR -XI BXI=BXI +XR	BYR=BYR -YR BYI=BYI -YI	BZR=BZR +ZI BZI=BZI -ZR	
	CWR=CWR +WR CWI=CWI +WI	CXR=CXR -XI CXI=CXI +XR	CYR=CYR -YR CYI=CYI -YI	CZR=CZR +ZI CZI=CZI -ZR	
	DWR=DWR +WR DWI=DWI +WI	DXR=DXR -XI DXI=DXI +XR	DYR=DYR -YR DYI=DYI -YI	DZR=DZR +ZI DZI=DZI -ZR	

FIG. 81

C7

C7	AWR=AWR -WI AWI=AWI +WI	AXR=AXR -XR AXI=AXI -XI	AYR=AYR +YI AYI=AYI -YR	AZR=AZR -ZR AZI=AZI +ZI	~2632 2800
	BWR=BWR -WI BWI=BWI +WI	BXR=BXR -XR BXI=BXI -XI	BYR=BYR +YI BYI=BYI -YR	BZR=BZR -ZR BZI=BZI +ZI	
	CWR=CWR -WI CWI=CWI +WI	CXR=CXR -XR CXI=CXI -XI	CYR=CYR +YI CYI=CYI -YR	CZR=CZR -ZR CZI=CZI +ZI	
	DWR=DWR -WI DWI=DWI +WI	DXR=DXR -XR DXI=DXI -XI	DYR=DYR +YI DYI=DYI -YR	DZR=DZR -ZR DZI=DZI +ZI	

FIG. 82

THIS TABLE SHOWS THE ORDER OF CALCULATION FOR A TRANSPOSED BUTTERFLY:

2810 ↗

2632 ↖

C0		AWR = WR+XR+YR+ZR AWI = WI+XI+YI+ZI	AXR = WR-XI-YR+ZI AXI = WI+XR-YI-ZR	AYR = WR-XR+YR-ZR AYI = WI-XI+YI-ZI	AZR = WR+XI-YR-ZI AZI = WI-XR-YI+ZR
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

FIG. 83

2810 ↗

2632 ↖

C1		AWR = AWR-(WI+XI+YI+ZI) AWI = AWI+(WR+XR+YR+ZR)	AXR = AXR-(WI+XR-YI-ZR) AXI = AXI+(WR-XI-YR+ZI)	AYR = AYR-(WI-XI+YI-ZI) AYI = AYI+(WR-XR+YR-ZR)	AZR = AZR-(WI-XR-YI+ZR) AZI = AZI+(WR+XI-YR-ZI)
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-

FIG. 84

C2	-	-	-	-	2632	2810
	-	-	-	-		
	$BWR = WR + XR + YR + ZR$ $BWI = WI + XI + YI + ZI$	$BXR = WR - XI - YR + ZI$ $BXI = WI + XR - YI - ZR$	$BYR = WR - XR + YR - ZR$ $BYI = WI - XI + YI - ZI$	$BZR = WR + XI - YR - ZI$ $BZI = WI - XR - YI + ZR$		
	-	-	-	-		
	-	-	-	-		
	-	-	-	-		
	-	-	-	-		

FIG. 85

2632

2810

C3

-	-	-	-	-
-	-	-	-	-
BWR = BWR - (WI + XI + YI + ZI) BWI = BWI + (WR + XR + YR + ZR)	BXR = BXR - (WI + XR - YI - ZR) BXI = BXI + (WR - XI - YR + ZI)	BYR = BYR - (WI - XI + YI - ZI) BYI = BYI + (WR - XR + YR - ZR)	BZR = BZR - (WI - XR - YI + ZR) BZI = BZI + (WR + XI - YR - ZI)	
-	-	-	-	-
-	-	-	-	-
-	-	-	-	-

FIG. 86

C4	2632				2810
	-	-	-	-	
	-	-	-	-	
	-	-	-	-	
	-	-	-	-	
C5	$CWR = WR + XR + YR + ZR$ $CWI = WI + XI + YI + ZI$	$CXR = WR - XI - YR + ZI$ $CXI = WI + XR - YI - ZR$	$CYR = WR - XR + YR - ZR$ $CYI = WI - XI + YI - ZI$	$CZR = WR + XI - YR - ZI$ $CZI = WI - XR - YI + ZR$	
	-	-	-	-	

FIG. 87

C5	2632				2810
	-	-	-	-	
	-	-	-	-	
	-	-	-	-	
	-	-	-	-	
C6	$CWR = CWR - (WI + XI + YI + ZI)$ $CWI = CWR + (WR + XR + YR + ZR)$	$CXR = CXR - (WI + XR - YI - ZR)$ $CXI = CXI + (WR - XI - YR + ZI)$	$CYR = CYR - (WI - XI + YI - ZI)$ $CYI = CYI + (WR - XR + YR - ZR)$	$CZR = CZR - (WI - XR - YI + ZR)$ $CZI = CZI + (WR + XI - YR - ZI)$	
	-	-	-	-	

FIG. 88

2632

2810

C6	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
DWR = WR+XR+YR+ZR DWI = WI+XI+YI+ZI	DXR = WR-XI-YR+ZI DXI = WI+XR-YI-ZR	DYR = WR-XR+YR-ZR DYI = WI-XI+YI-ZI	DZR = WR+XI-YR-ZI DZI = WI-XR-YI+ZR		

FIG. 89

2632

2810

C7	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
-	-	-	-	-	-
DWR = DWR-(WI+XI+YI+ZI) DWI = DWI+(WR+XR+YR+ZR)	DXR = DXR-(WI+XR-YI-ZR) DXI = DXI+(WR-XI-YR+ZI)	DYR = DYR-(WI-XI+YI-ZI) DYI = DYI+(WR-XR+YR-ZR)	DZR = DZR-(WI-XR-YI+ZR) DZI = DZI+(WR+XI-YR-ZI)		

FIG. 90

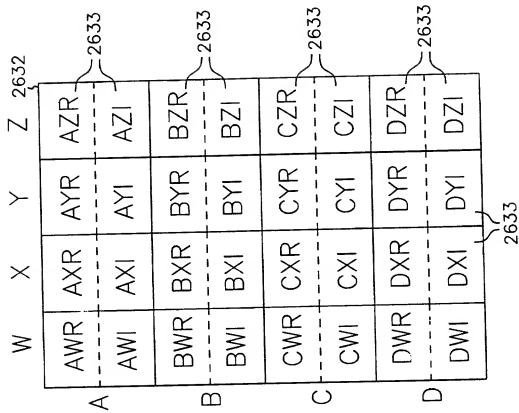


FIG. 91

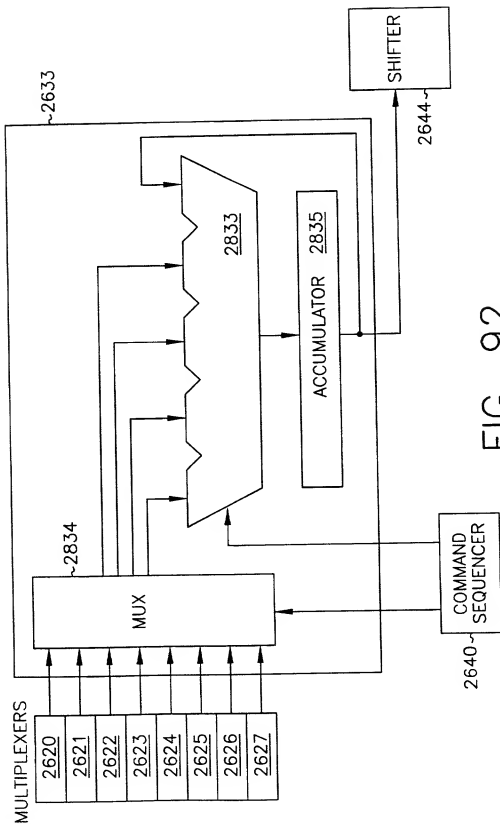


FIG. 92

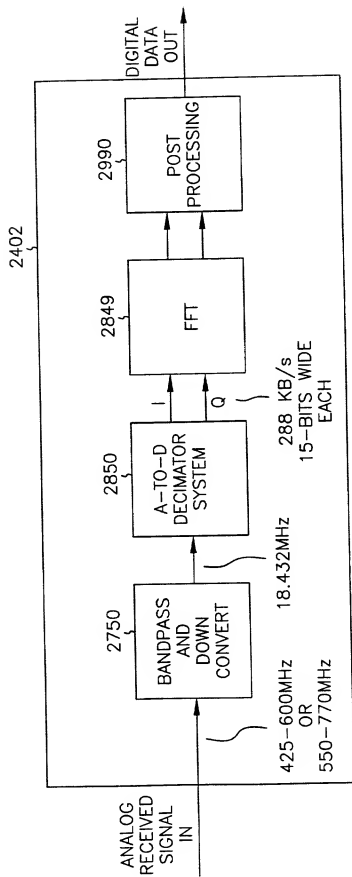
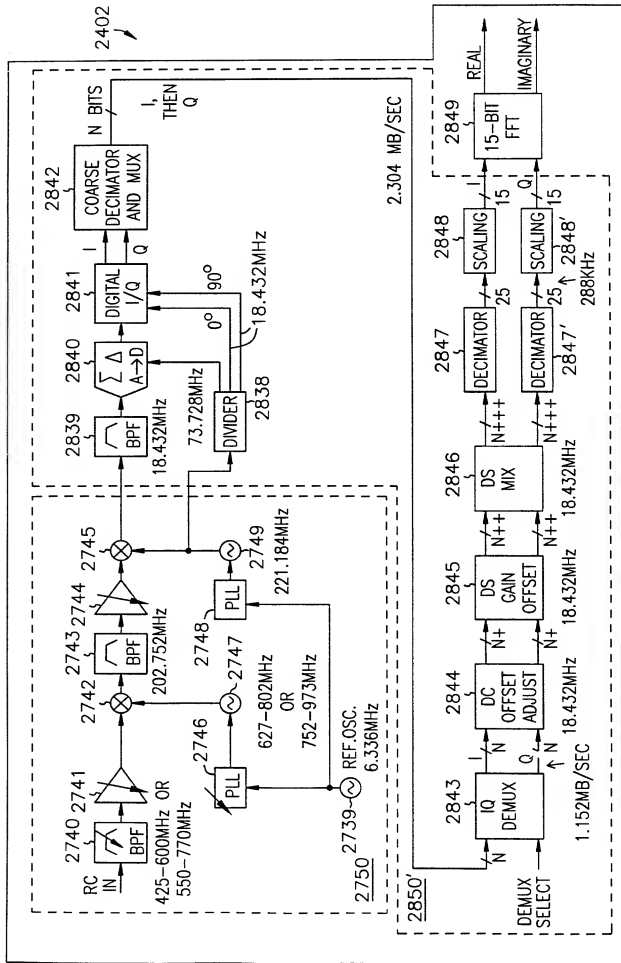


FIG. 93



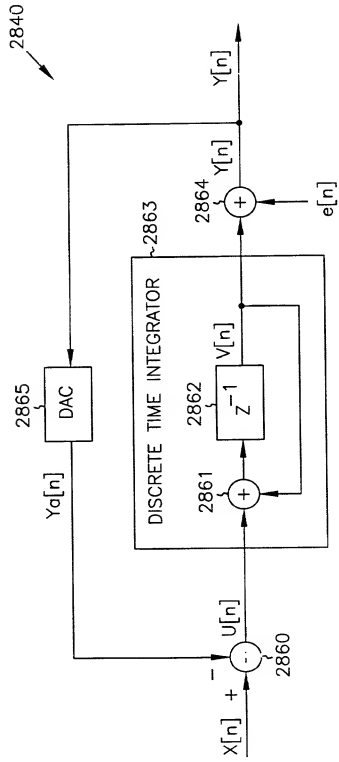


FIG. 95

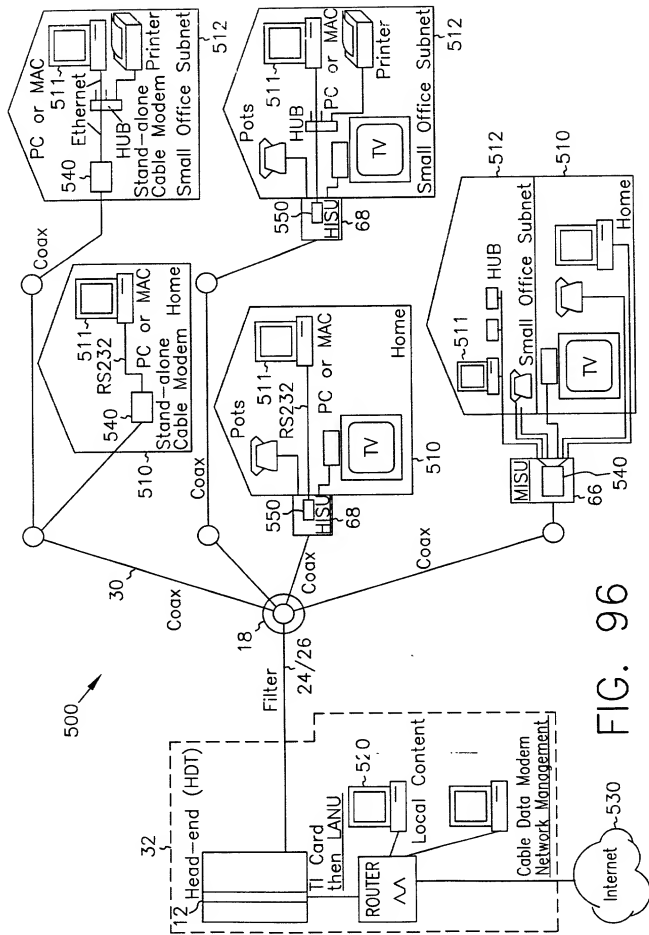


FIG. 96

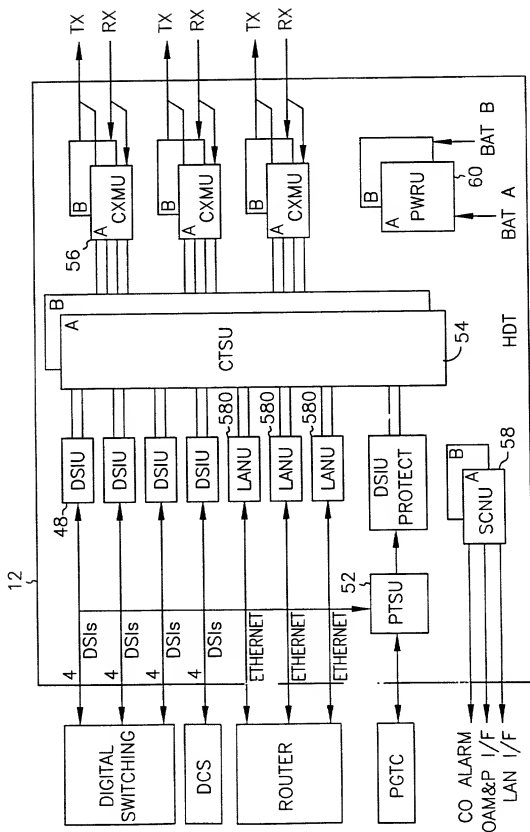


FIG. 97

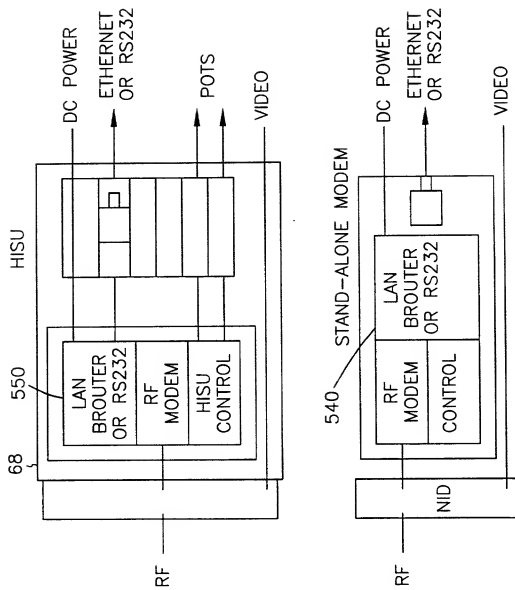


FIG. 98

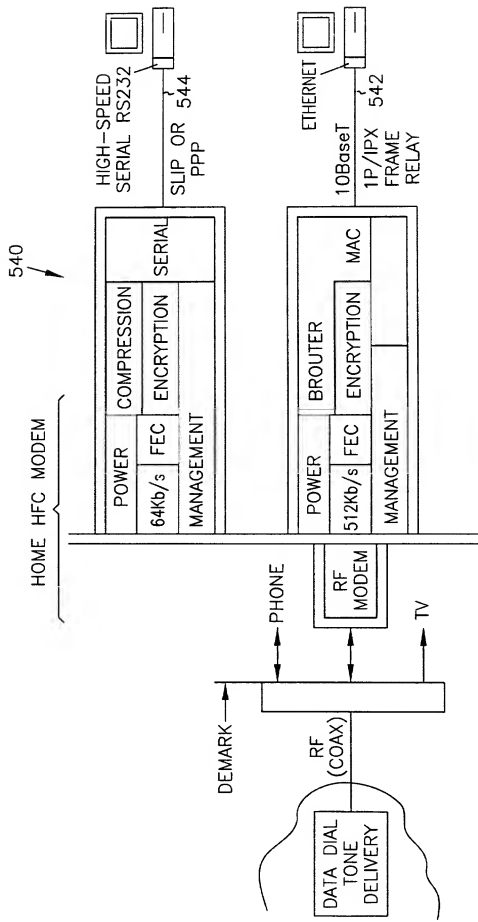


FIG. 99

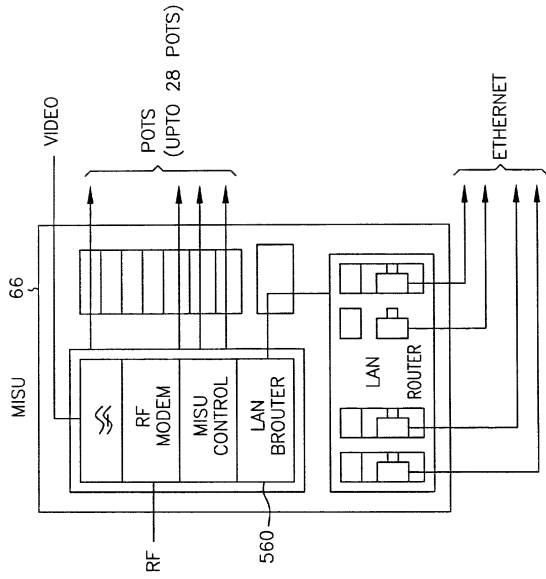


FIG. 100

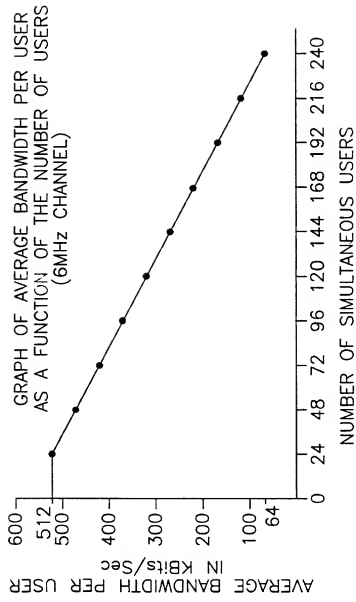
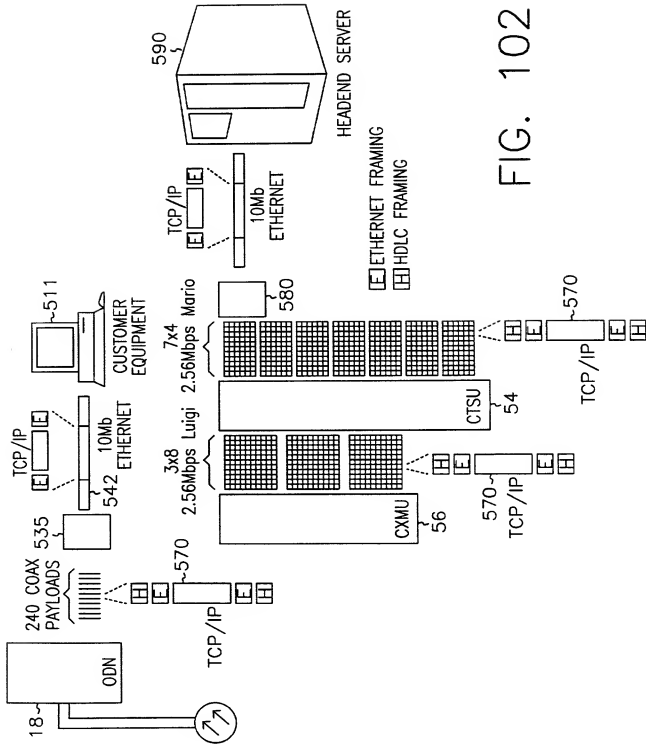


FIG. 101



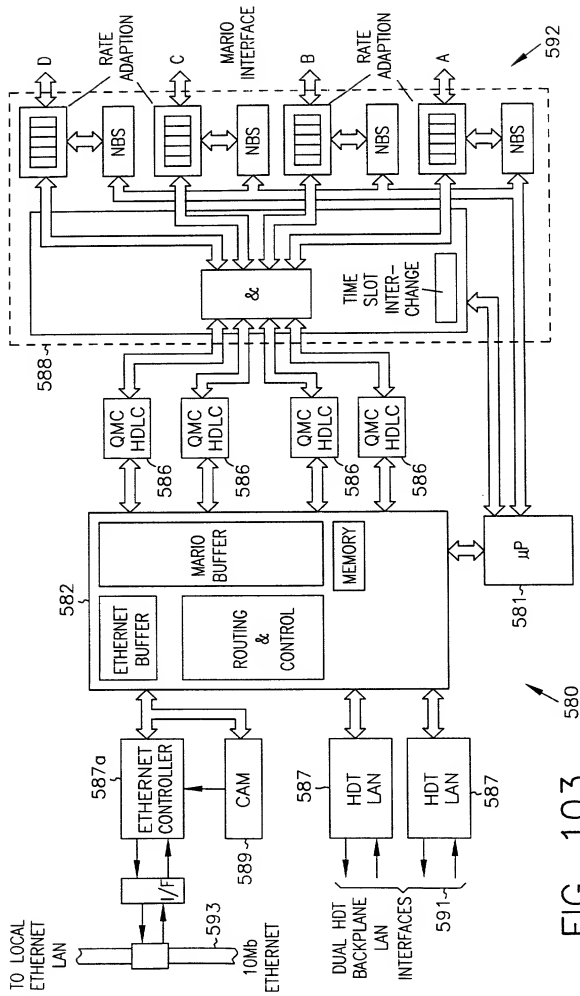


FIG. 103





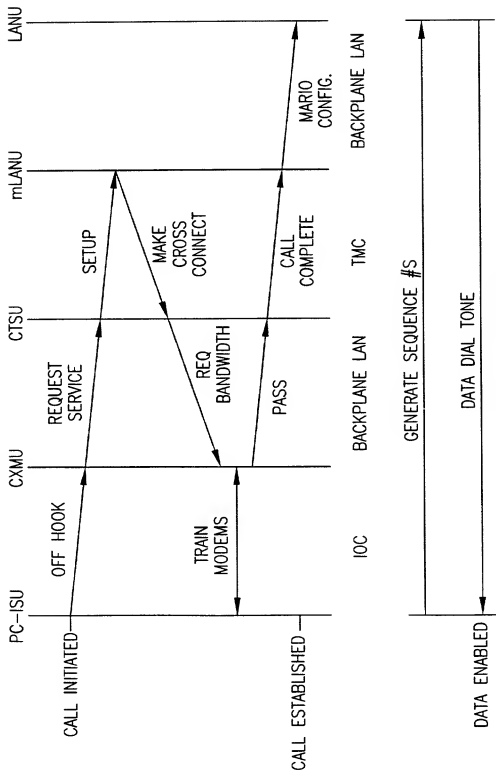


FIG. 106

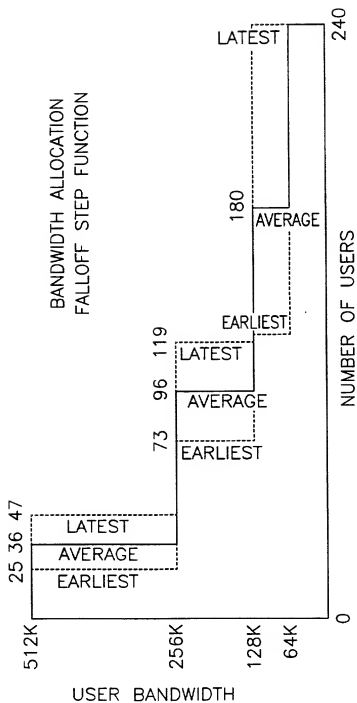


FIG. 107

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

THE RF SPECTRUM OF 24 USERS WITH 512Kbs

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

ADDING THE 25th USER

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
---	---	---	---	---	---	---	---	---	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----

ADDING THE 26th USER, ETC

FIG. 108



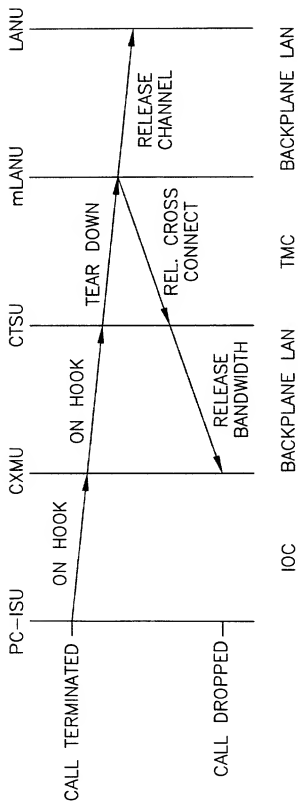


FIG. 110

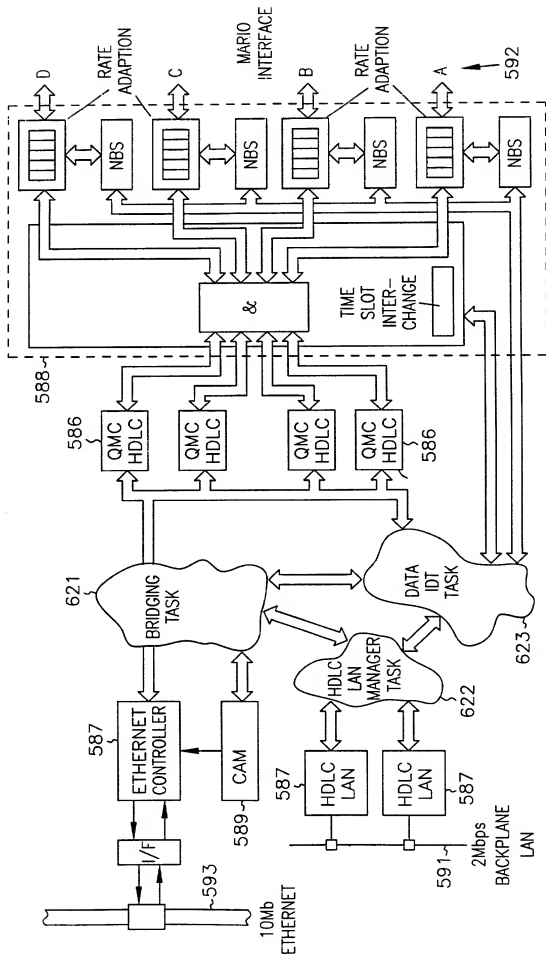


FIG. 111

620

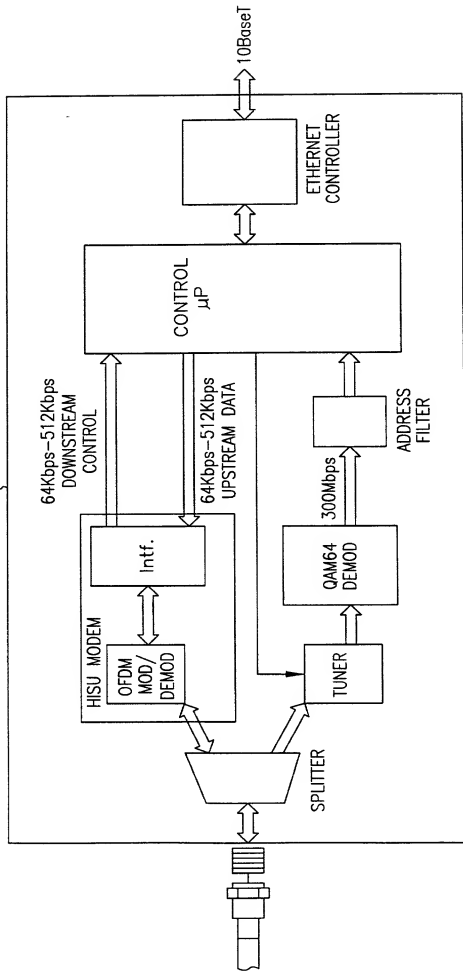


FIG. 112

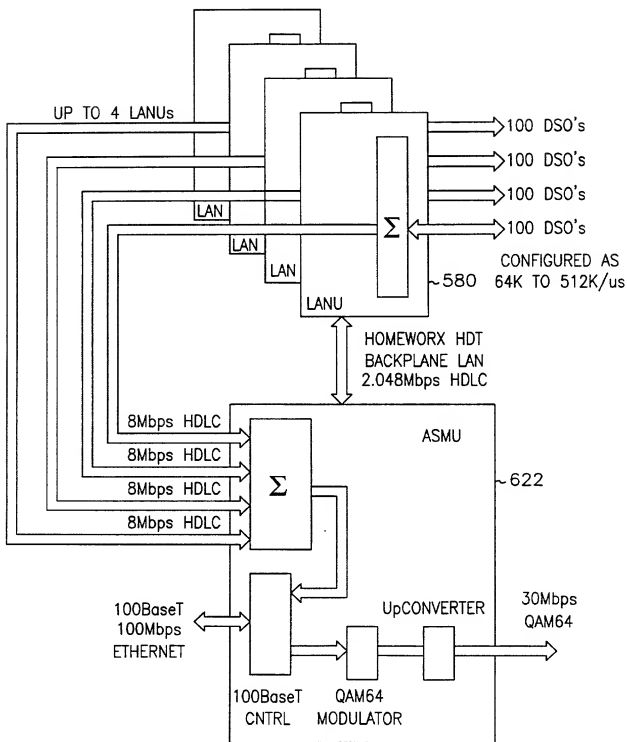


FIG. 113

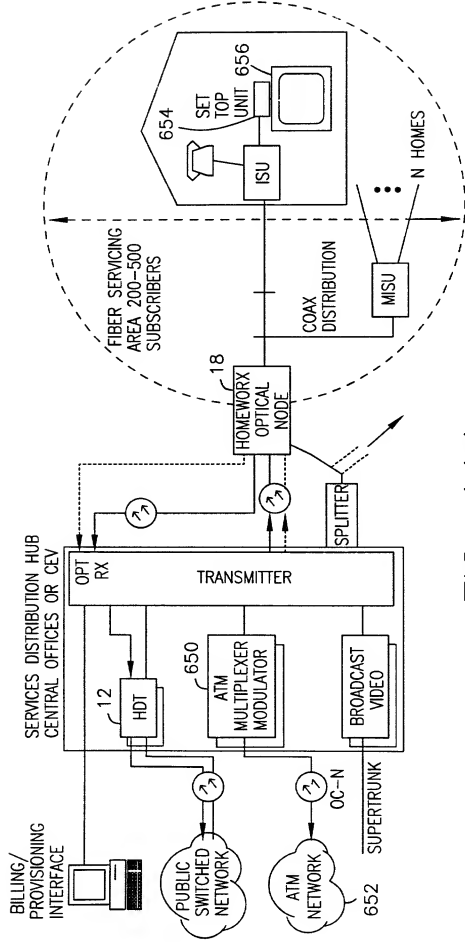


FIG. 114

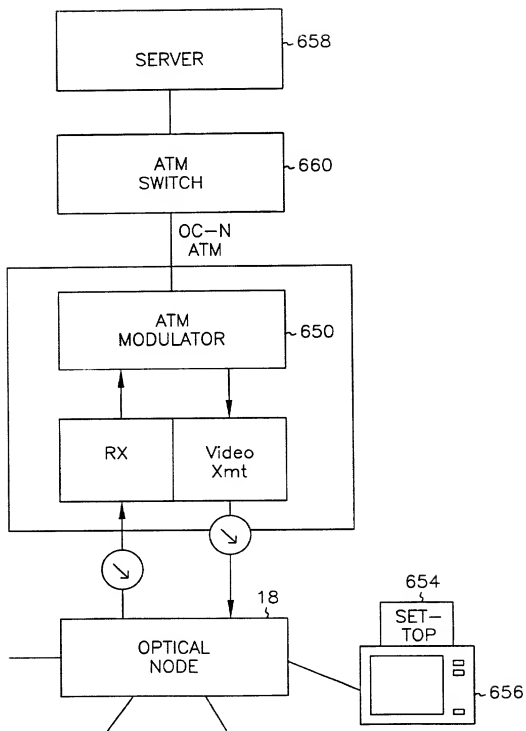


FIG. 115

FIG. 116

1012

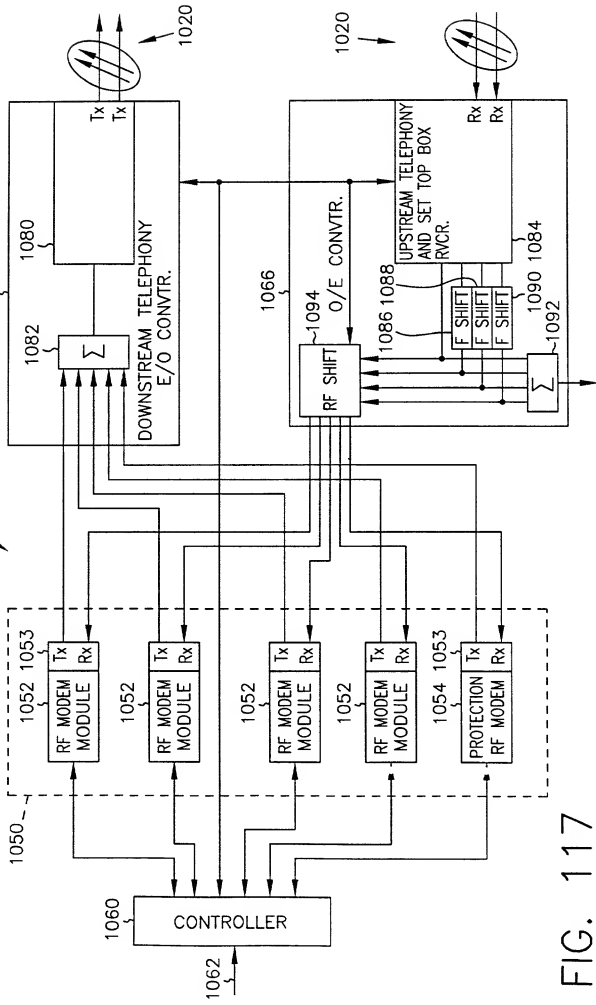


FIG. 117

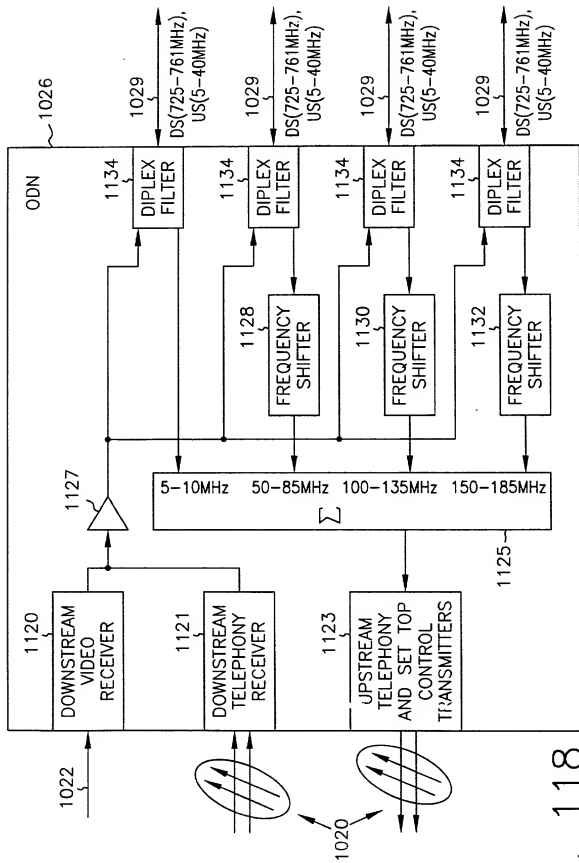


FIG. 118



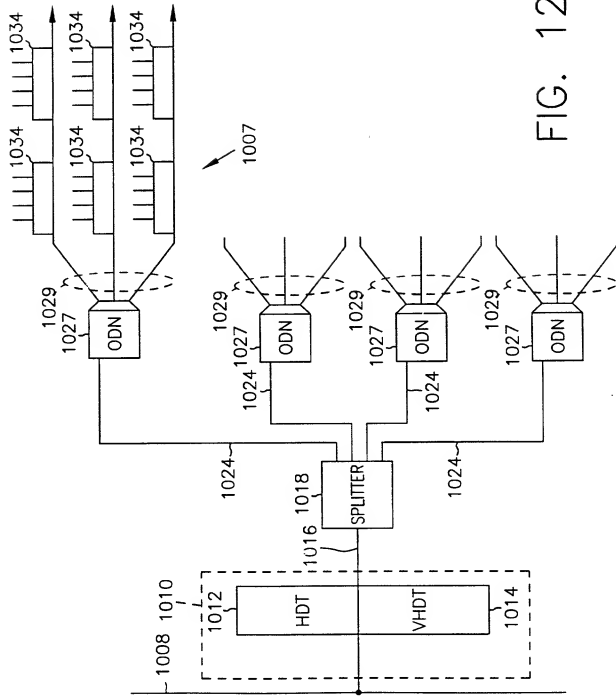


FIG. 120

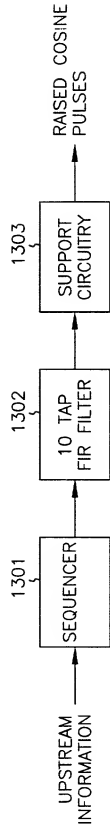


FIG. 121

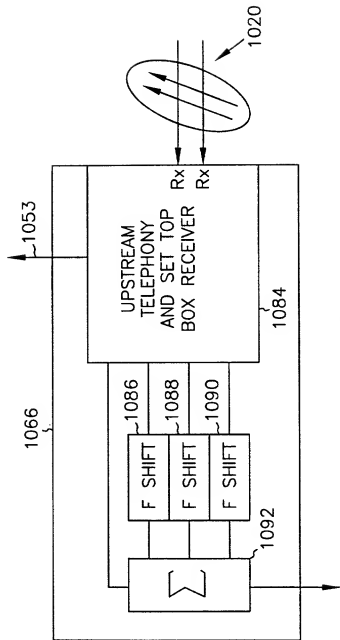


FIG. 122

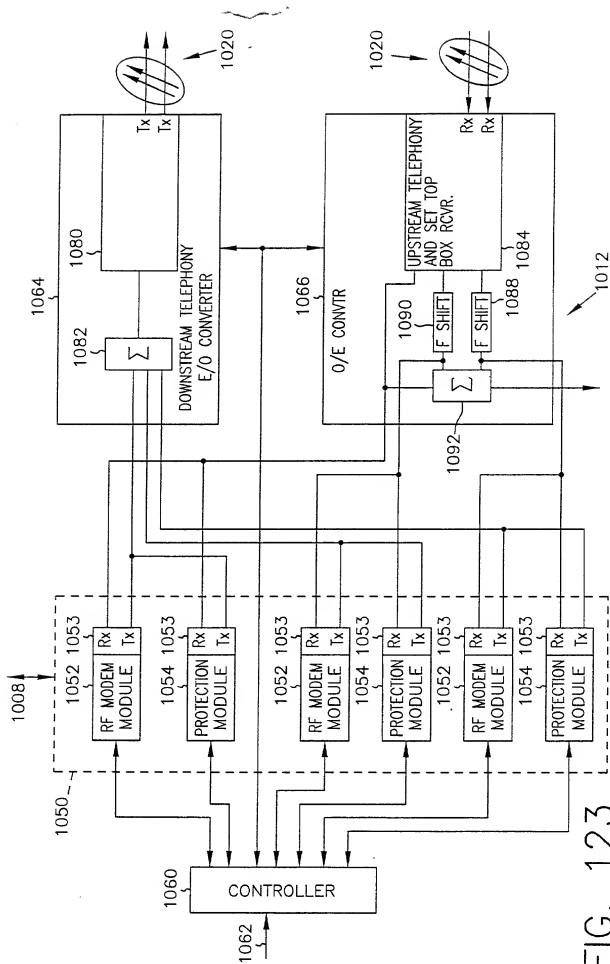


FIG. 123